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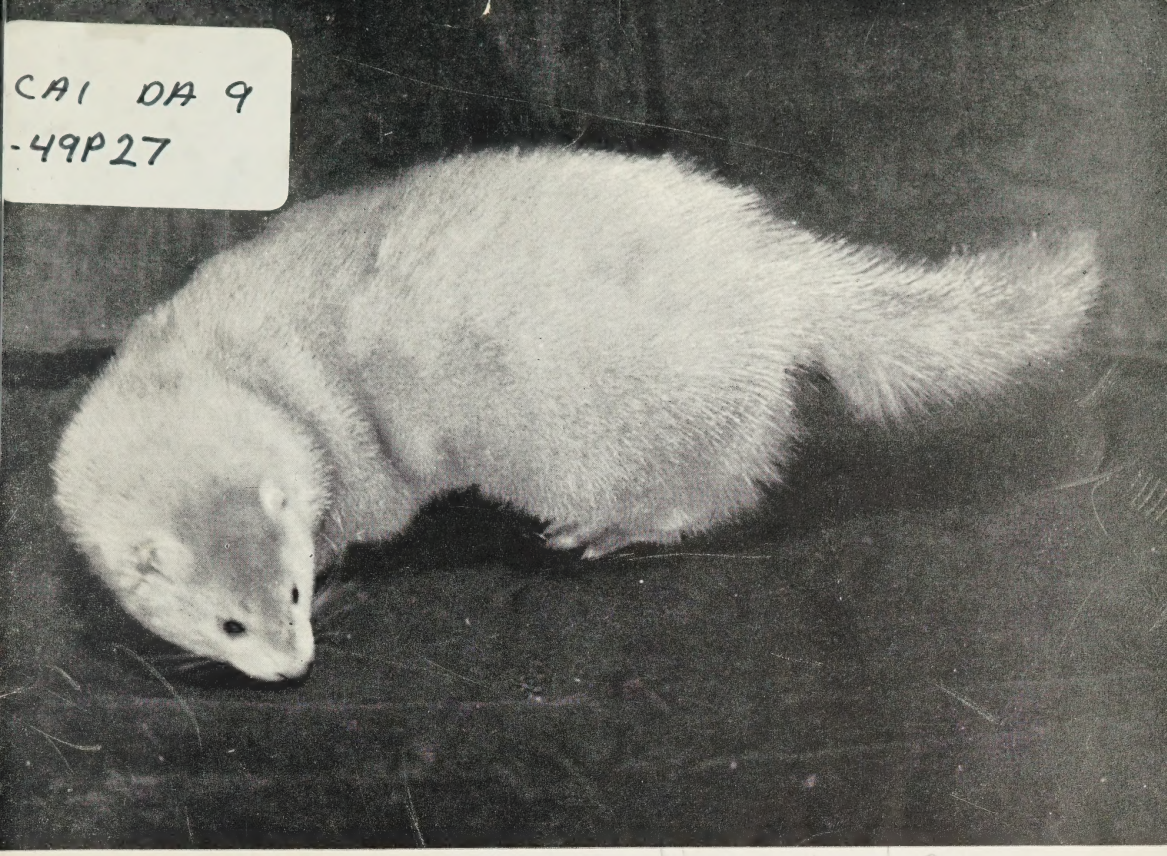

Silverblu Mink

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MINK RANCHING

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SUMMERSIDE, P.E.I.

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INTRODUCTION

Mink ranching originated in Canada at the beginning of the century and has since grown to be an important branch of the Canadian fur farming industry. As a result of the general expansion of fur farming, in conjunction with the increased value of mink fur and the relative ease with which these animals can be propagated and raised in captivity, mink ranching has undergone great expansion during the past twenty years.

Mink are the larger members of the weasel family, Mustelidae. They belong to the genus *Mustela* and the species *vison*, therefore, the scientific name of the mink is *Mustela vison* (Peale, Beauvois and Schreb). Mink have small heads, short ears, long slender bodies, short legs and their individual body weights range from one and a half to four and a half pounds. The males are usually larger than the females and weigh approximately twice as much. The colour of wild mink varies from light brown to almost black. In the wild state they are found chiefly in the northern regions of this continent, where some fourteen "geographical" strains are distinguished in Canada. (See map page 4.) However, only a few of these strains are used as parental stock for most of the Canadian ranch-bred mink. These are Eastern strains from Quebec and Labrador and the larger Northwestern and Yukon strains. However, these latter strains have been so cross-bred that they are no longer readily distinguishable in ranch-bred mink.

As a result, however, of the wide difference in climatic and other environmental conditions across Canada, considerable variation necessarily exists in the manner of housing and feeding mink in their semi-domesticated state, on mink ranches.

This bulletin outlines methods of ranching mink which will be generally applicable to conditions in Canada. The subject material for convenience of description has been subdivided under the main headings of: location of the ranch, housing of mink, selection of breeding stock, mink breeding method, feeding of mink and primeness of fur, and the pelting of mink.

The author is indebted to several Canadian mink ranchers for suggestions in the preparation of the material for this bulletin.

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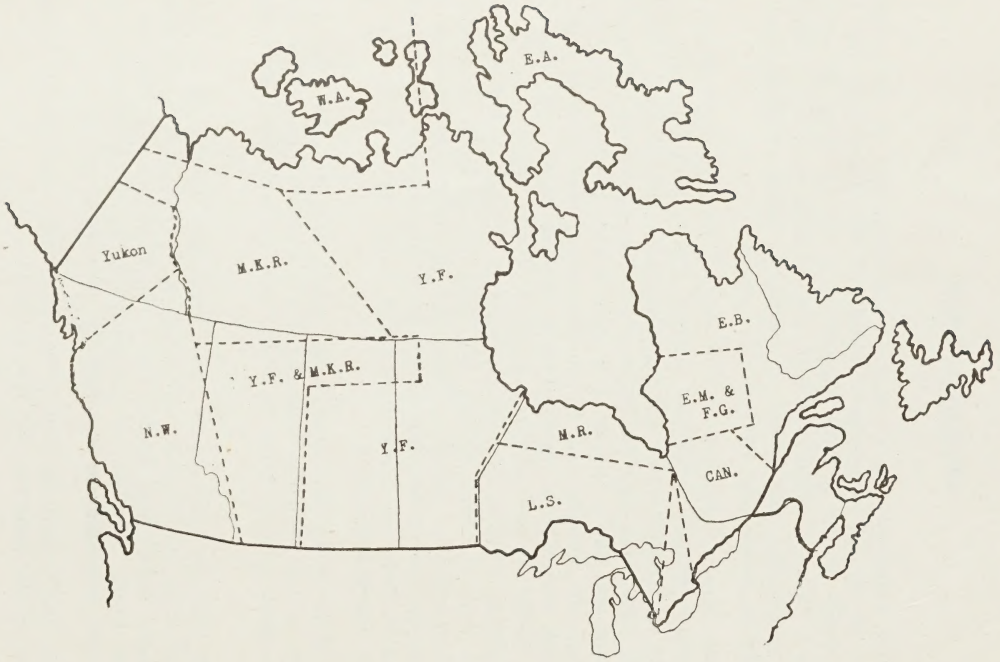


WILD MINK STRAINS IN CANADA

Territory enclosed in broken lines shows where each is located, while other unbroken lines indicate provincial boundaries.

EXPLANATORY NOTES FOR MAP OF CANADA SHOWING AREAS FROM WHICH SOME OF THE DIFFERENT CANADIAN STRAINS OF MINK HAVE THEIR ORIGIN (AFTER RITCHIE)

Type of Mink	*Location and Quality of Fur*
E.B.	Esquimo Bay mink are the finest wild mink in Canada.
E.B. (Gulf type)	A different type of mink known as "Labradors" are found along the Gulf of St. Lawrence, but these are not so fine as those of the interior of Quebec.
East Main and Fort George type	The fur trade recognizes this type as the second finest strain of mink in Canada.
Can.	"Canada" type mink are found chiefly along the St. Lawrence River and Maritime Provinces of New Brunswick and Nova Scotia. In the latter province they have replaced the almost extinct variety of "Fine New Englands" which were a very fine mink comparing favourably with "Fine Easterns", while the "Canadas" are a relatively coarse type of mink.
M.R.	In Northern Ontario, from the Toronto area to Moose Factory, there are about eight different types of mink varying in quality according to climatic conditions.
L.S.	Lake Superior mink are a large strain and, in some sections, have a silky texture but they usually do not have good coverage.
MK. R.	Mackenzie River mink are a fine type of large mink.
Y.F. MK. R.	York Fort-MacKenzie River mink are a very fine class of mink found around Fond du Lac. They are smaller sized mink of good quality.
Y.F.	York Fort mink (so called because ships formerly went through the Hudson's Bay to York Fort), are among the finest and best known types of mink. In the southern portion of the area, represented on the map by Y.F. in Manitoba and Saskatchewan, the mink are large but open furred compared with the Eastern mink.
N.W.	North Western mink are found near Fort Norman and Northwestern British Columbia. These are very fine large mink, finer than the true Yukon type and often confused with it.
Yukon	Yukon types vary according to whether they are from the coastal region or inland. Pelts from the coastal region are readily detected by their greasy condition, and open fur while further north, inland, the true Yukon is found. It has fine fur and is more like the fine Alaskan type of mink.

LOCATION OF THE MINK RANCH

A suitable location for the mink ranch is important. Many factors should be carefully studied before the final decision is made as to the best location for a mink ranch. These entail, not only the immediate ground features of the site for the new ranch, but such considerations as proximity to cold storage facilities, feed supplies, railway stations, source of electric power and other features.

Where sheds are used to house the mink, generally it is advantageous to have them in a north-south direction to equalize the light falling on both sides. Mink sheds should be situated on a well-drained site. Usually, sandy soil on a gentle slope with some shelter, where snow does not drift too deeply during the winter season, makes a suitable location. Moderate shelter from excess wind is also desirable in the location of a mink ranch because excessive wind has a detrimental drying effect upon mink fur which detracts from its lustre and quality as a market product. To obtain such conditions, some ranchers prefer a river valley location or land close to water for dampness at night to produce more desirable furring conditions.

A good water supply should be available. However, this is necessary only for drinking purposes, because mink are ranched most successfully without swimming pools or other facilities which enable the animals to wet themselves. Wetting of the fur during the furring season gives rise to off-coloured undesirable pelts. For this reason, modern mink ranchers use special drinking cups, which merely permit access to drinking water. A convenient source of power to operate the grinding and freezing equipment, and proximity to sources of mink feeds are other factors to be considered.

GUARD FENCE

When the site of the mink ranch has been chosen and construction of the sheds and pens has been completed, the next thing to take into consideration is the building of a guard fence. As its name implies, this is merely a board or wire fence surrounding the breeding pens and sheds of the ranch. It is a part of the equipment that will pay for itself in a short time by preventing valuable animals from escaping.

A guard fence is also a safeguard against animals getting into the ranch and against the introduction of infectious diseases from roaming animals in the vicinity of the ranch. This is particularly true of large commercial ranches located near urban centres where diseases such as canine distemper may be a serious menace to fur ranchers. Where the guard fence is in the form of a high board fence surrounding the breeding pens or sheds, it will also serve to give the animals a certain amount of seclusion.

A suitable fence can be constructed of ordinary lumber, wire netting on metal posts or combinations of these materials.

The more common type of guard fence is one in which cedar posts and two by four inch stringers are used as the supporting framework for wire mesh. The wire is one-inch mesh of number 16 gauge, and five feet high. In the construction of such a fence as shown in Figure 1, one foot of the wire mesh is embedded in the ground to prevent mink from digging under the fence.

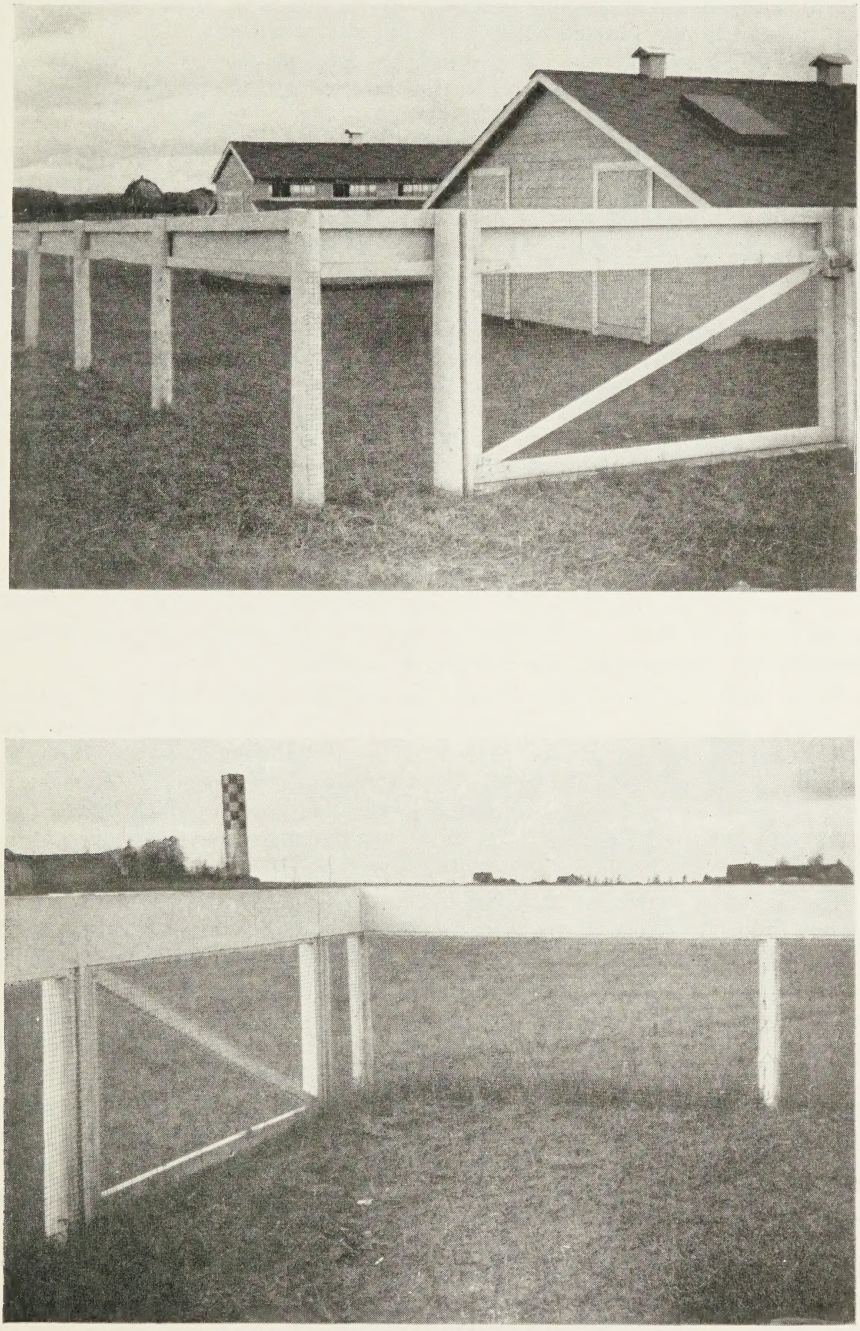


Fig. 1—Views showing construction of a mink guard fence. (Above): Outside view. (Below): Inside view.

Some fences are built with a 12-inch section of galvanized iron leaning inward from the top of the fence at an angle of 45 degrees. More recent models simply make the top 12 inches of the fence of smooth galvanized iron as shown in the accompanying figures. Both methods serve the purpose of preventing the mink from climbing over the guard fence.

Figure 1 shows the general method for construction of a suitable guard fence which is five feet in height, also the interior surface of the same fence.

HOUSING OF MINK

The housing requirements of mink vary with the ranching conditions found in different parts of Canada. In general, mink houses must facilitate good sanitation, must be conducive to good health and normal reproduction, and must supply desirable furring conditions for animals kept under a state of semi-domestication.

In Canada mink are reared mainly in two kinds of housing structures: outdoor pens often arranged in groups or batteries, or in small individual pens supported on stringers, or suspended from the roof within a shed structure. Good results have been reported by ranchers who use either of these different methods for housing mink. Shelter from storms and heavy snowfall will largely determine whether outside pens can be used successfully. Where the climate is mild, mink do well in outdoor pens. These are less expensive to construct than sheds. Generally, however, sheds are better suited for breeding and rearing mink in Canada. The structure of individual breeding and furring pens in use varies considerably. These differences of design have resulted from attempts by different ranchers to adapt their pen structure to their own requirements in the rearing and furring of mink.

Mink pens and sheds should provide sanitary, well ventilated conditions with warm, dry nests. They should also be constructed with a view to facilitating cleaning operations, to rearing young and to properly furring out the mink, while allowing adequate room for exercise. Special consideration should be given to good natural lighting in the shed and provision made for the breeding stock to have access to an outdoor existence when weather conditions permit.

The layouts shown in this bulletin have been evolved from a study of different kinds of mink sheds used for breeding and furring purposes, and of the many different types of pen construction found in Canadian mink ranches.* The methods of construction with written and photographic descriptions are given in some detail to assist the beginner in mink ranching to follow the descriptive material. Although the models of pens and sheds described herein are not the only kinds with which successful mink ranching may be conducted, they offer some economical advantages and useful conveniences for carrying out the many operations necessary in the rearing of mink under ranch conditions. The manner in which these sheds and pens can be used is outlined below, with the details of their construction, and application to the housing of mink.

---

* Note: Detailed plans are available on request showing mink breeding and furring sheds as well as breeding and furring pens.

The series of photographs in this bulletin show the respective mink sheds and pens constructed from these plans at the Dominion Experimental Fur Farm, Summerside, P.E.I.

The plans of the sheds have been drawn with sectional units so that buildings of any desired length can be constructed as required and the necessary amount of materials computed from the lists of building materials given in the text.

Mink Breeding Shed

The breeding shed must provide suitable conditions for the housing and rearing of young mink.

A type of shed which allows the mink to have a combination indoor and outdoor existence is shown in Plates I and II, Figures 4-7. Figures 1-3 on Plate I show the method of construction from the early stages to the completed structure.

In Plate I, Figure 4, the completed breeding shed is shown. Here, the shed is completely closed in, as it will be during the late winter and breeding season, with both hinged and removable sidewall shutters in place. However, adequate natural lighting is supplied through rows of windows along each side of the shed. Ventilation is effected through the small roof ventilators placed at intervals along the roof.

LIST OF MATERIAL FOR MINK BREEDING SHED, 15′-0″ x 50′-0″

Item No.	No. Pieces	Size inches	Length Feet	Description	Feet B.M.
1	12	6″ diam.	6′-8″	Cedar posts for side wall embedded 2′-6″ in ground and squared to 4″ x 4″ above ground.	.....
2	16	6″ diam.	2′-10″	Cedar posts under sill, 10′-0″ on centre and at end walls embedded 3′-6″ in ground.	.....
3	22	2 x 6	10′-0″	Cage supports (20 required)	220
4	2	2 x 6	12′-6″	Tie at each end of building (4 pieces 6′-0″ required)	24
5	28	2 x 4	7′-0″	Studs (26 required)	131
6	42	2 x 4	10′-0″	Plate (40 required)	280
7	11	2 x 4	10′-0″	Sill (10 required)	74
8	12	2 x 4	10′-0″	End walls and door frames	80
9	5	2 x 4	14′-0″	To cut 18 ties, 3′-6″ long	47
10	54	2 x 4	10′-0″	Rafters, to cut one upper and one lower from each 10′-0″ length (52 required)	360
11	10	2 x 4	10′-0″	Ledger for lower rafters	67
12	9	2 x 4	12′-0″	To cut for window sills	72
13	3	2 x 4	10′-0″	To cut braces between posts, (10 pieces 2′-0″ long required)	20
14	28	1 x 6	8′-6″	Rafter ties	119
15	10	1 x 6	10′-0″	Ridge boards, door battens and removable board below door.	50
16	.....	$\frac{7}{8}$ x 6	.....	T & G roof sheathing	1175
17	.....	$\frac{7}{8}$ x 6	.....	T & G end wall sheathing	300
18	.....	$\frac{7}{8}$ x 6	.....	T & G side wall sheathing	240
19	.....	$\frac{7}{8}$ x 6	.....	T & G sheathing for hinged shutters panel shutters and doors	600
20	.....	1 x 10	.....	Battens on bottom of doors, 8 lineal feet	7
21	.....	1 x 4	.....	Battens and trim, 400 lin. feet	134
22	.....	1 x 2	.....	Nailed to posts, 20 lin. feet	4
23	10	only	.....	Squares, shingles or roll roofing	.....
24	20	only	.....	Sash for windows, 4 lights, 10″ x 12″ glass	.....
25	3	only	.....	Ventilators 8″ x 8″ inside	.....
26	40	only	.....	10″ strap hinges for hinged shutter	.....

Plate II, Figure 5, shows the hinged shutters open with the ends of the breeding pens exposed. During the autumn and early winter season, the hinged shutters can be permitted to remain open or can be closed readily during stormy weather.

Plate II, Figure 6, shows the breeding shed with the breeding pens extending outside beyond the shed wall to give the breeding mink the advantage of an outdoor existence. The lower removable shutters have also been removed to give further ventilation during hot weather and to prevent them from becoming smeared with droppings while the pens are extended beyond the shed wall. This feature is very important because provision for an outdoor existence helps to keep the animals in good health and promotes normal breeding.

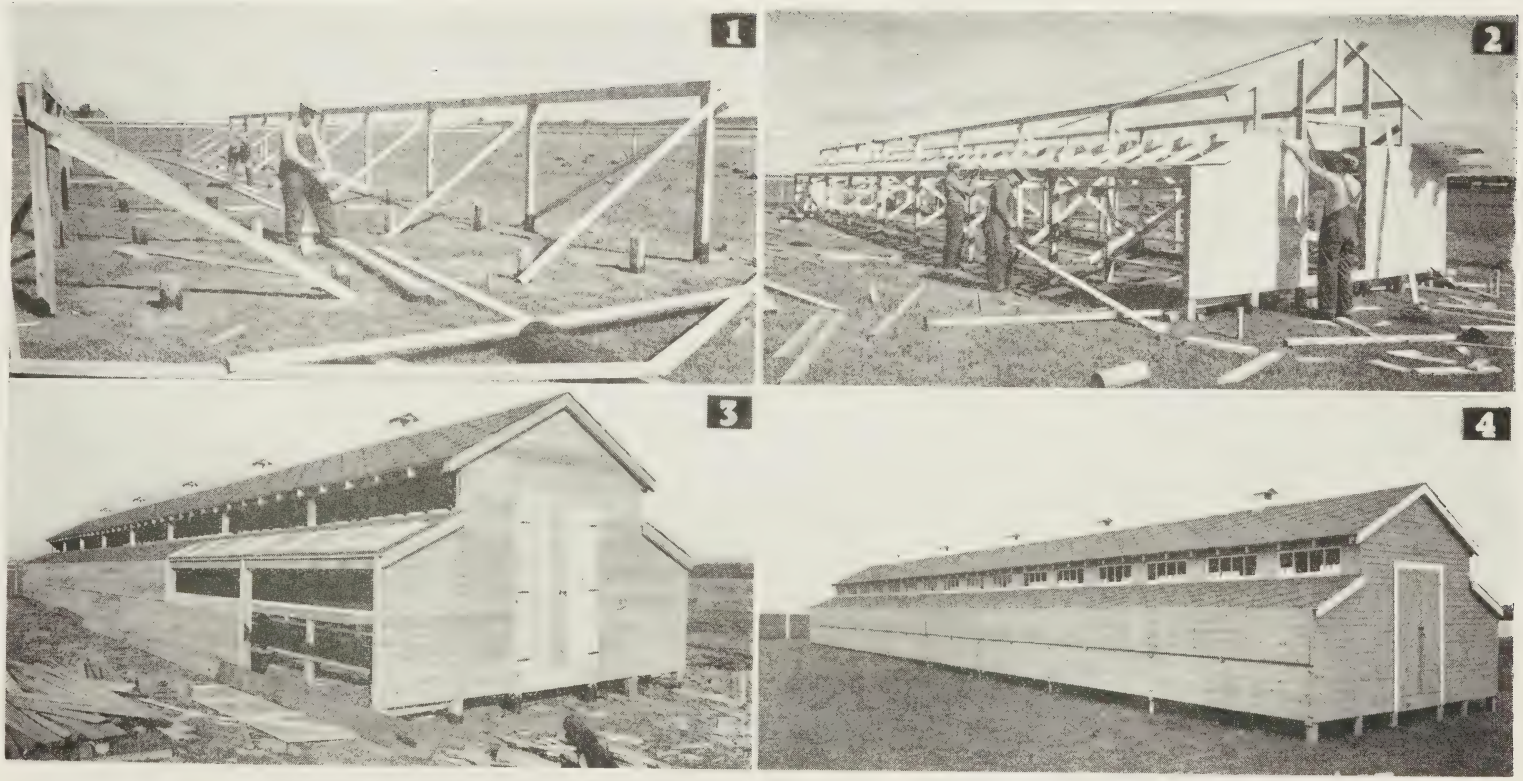


PLATE I

Figures 1-3 show different phases of construction of a mink breeding shed. Figure 4 shows the complete shed with shutters closed.

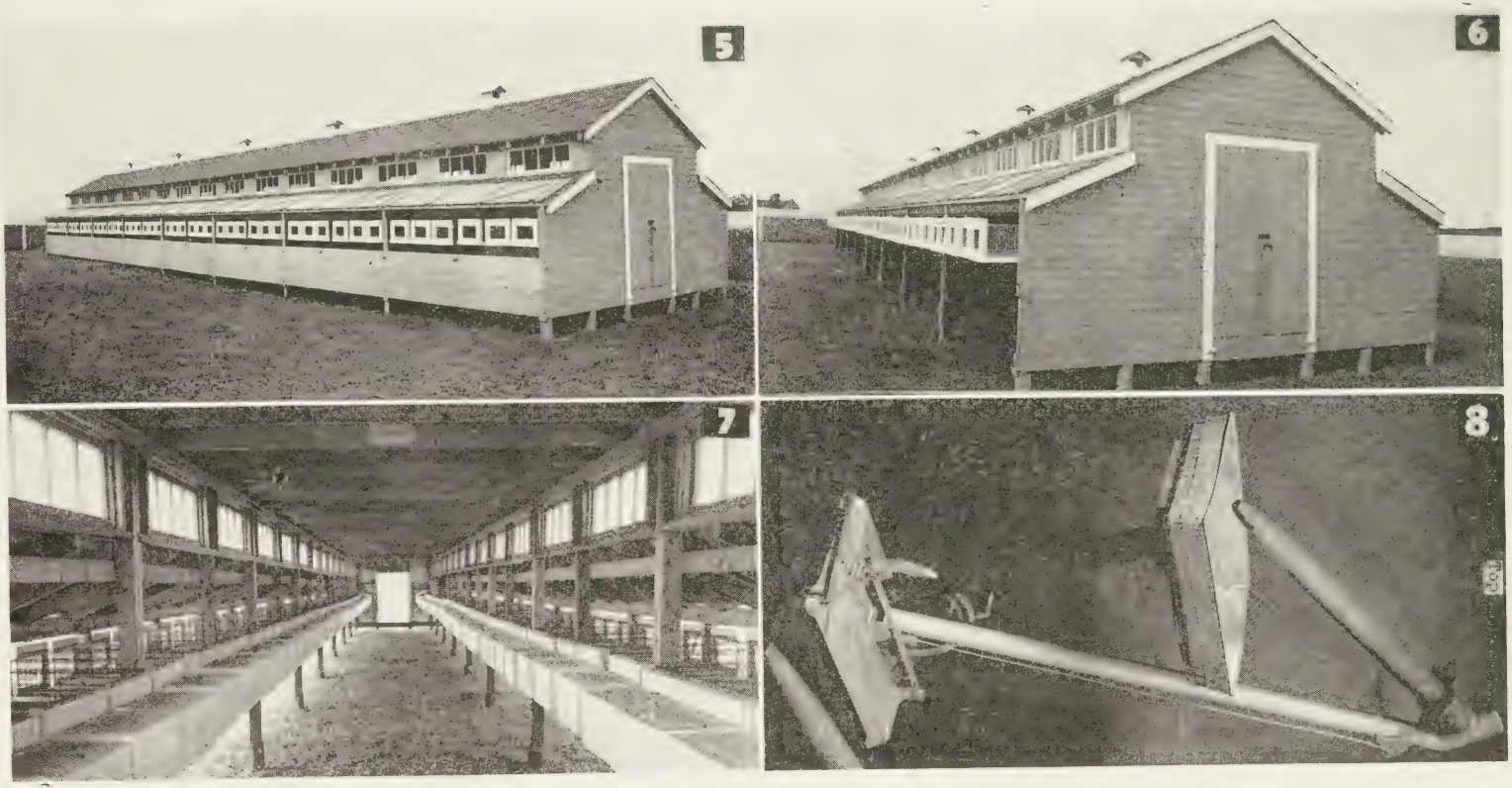


PLATE II

Figures 5 and 6 show exterior of the mink breeding shed while Figure 5 also shows hinged shutters open and ends of breeding pens exposed. Figure 6 shows lower shutters removed and breeding pens pulled out to give breeding stock advantages of outdoor existence. Figure 8 shows a fleshing beam and pan to catch waste material at pelting.

Plate II, Figure 7, shows the arrangement of the breeding pens within the breeding shed. A five-foot aisle is provided for convenience in conducting breeding operations within the shed during the breeding season. The pens are situated three feet from the ground which leaves ample room beneath them to facilitate cleaning.

Mink Breeding Pens

Photographs of mink pens for breeding and furring purposes are shown in Plates III and IV.

Plate III, Figure 2, shows the complete breeding pen with nest box attached. This type of pen is suitable for use in a mink breeding shed, but would be unsatisfactory for outdoor purposes. The pen is constructed of No. 16 gauge, one-inch mesh wire, in four-foot lengths. The wire is bent around an oblong frame to give it dimensions of 14″ wide and 10″ high after which it is removed and the edges of the wire are laced together. The ends of the wire are then nailed inside wooden frames. A hinged wooden door is fitted into one end of the pen while the front of the nest box covers the other end of the pen. The den is suspended by two bent iron hooks, as shown in the photographs, and its weight effectively closes the end of the pen.

With this type of pen construction, it is not necessary to catch the mink during the breeding season, but they are carried in the nest box. By merely placing a piece of tin, or a gloved hand, over the small exit door of the nest box, the mink cannot escape during transit. Each part of the equipment is made to standard measurements, so that they are all interchangeable. The door at the end of the pen away from the nest box is held closed by a spike which passes through the frame of the cage into the frame of the door.

Plate III, Figure 3, shows the nest box parts before being assembled. Note that the door of the nest box and the opening through the partition are lined with tin to prevent these openings becoming chewed and roughened and scuffing the fur of the mink as it passes through.

The bottom of the nest box is No. 16 gauge, one-inch mesh wire. However, this sanitary floor is only for summer use by the female mink and kits after they are large enough not to fall through the wire. During the winter and breeding seasons, the notched floor board supplies a wooden floor for the nest and alley-way of the nest box. The latter two compartments are separated by a partition board which is also removable, but held in place by staples. These project from the walls of the nest box and accordingly the floor board has to be notched to slide past them into position.

Similarly, the lid of the nest box is supported by four staples which can be seen in Plate III, Figure 4. These allow the wired lid with its detachable fill-in board to fit flush with the top of the nest box, as shown in Plate IV, Figure 5. During the summer season, this is enough protection for mink in a breeding shed, but during the winter and breeding season, the fill-in board on the lid is required to give warmth and seclusion to the female mink. This board fits over the wire portion of the lid and can be fastened down as shown in Plate IV, Figure 6.

During the whelping season and until the kits have grown large enough to prevent them falling through the one-inch mesh wire of the pen, sand screen wire or boards are used to form a floor in the breeding pen to prevent loss of kits.

To protect the wire and prevent dirt collecting in the pen where it rests on supports in the breeding shed, the breeding pens have two runners of one by two inch material. These are in contact with the supports, thus holding

the actual wire floor of the pen about two inches away from the upper sharpened edge of the permanent supports in the shed. These runners also make it easy to push the individual breeding pens in or out of the breeding shed, the latter being so adapted that the ends of the breeding pens can project outdoors if desired.

Some of the advantages of this type of construction of a mink nest box are:—

1. Being detachable, it eliminates the slower method of transferring mink by use of a catching box during the breeding season.
2. As a result of the standardized interchangeable parts, repairs can be made quite readily.
3. Cleaning operations can be conveniently carried out.
4. Necessary adjustments in ventilation and the change to a wire-floored nest box can be conveniently made with the advent of warm weather.

The list of materials for construction of such breeding pens, is given below:—

LIST OF MATERIALS FOR 100 MINK PENS AND MINK NEST BOXES

Item No.	Size of Lumber	Application	Feet B.M.
1	1 x 2	Runners and sides of mink pens 1,300 lineal feet	217
2	2 x 2	Cross pieces for mink pens 500 lineal feet	167
3	1 x 9	Two ends and rear of mink nest box, 300 lineal feet	225
4	1 x 14	Front of mink nest box, 150 lineal feet	177
5	1 x 9	Removable floor board in mink nest box, 140 lineal feet	105
6	1 x 7	Removable partition in mink nest box, 85 lineal feet	50
7	1 x 6	Removable lid board, 100 lineal feet	50
8	1 x 1½	Frame for removable lid on mink nest box and for closed end of mink pen, 810 lineal feet.	102
		320 sq. ft. of 1″ square mesh, galvanized welded wire of 15 or 16 gauge for removable lid and bottom of mink nest box and closed end of mink pen.	
		1700 sq. ft. 48″ wide of 1″ sq. mesh galvanized welded wire of 15 or 16 gauge for mink pen.	

Hinges, staples, buttons, nails, etc., are not included in above list.

Mink Furring Shed

If young mink are to be pelted the season they are born, they should be transferred to the furring shed. There, after weaning, they thrive better when placed in individual furring pens. If they are housed in pairs or groups in furring pens there is frequently difficulty from fighting and from an uneven distribution of feed to the individual mink, giving rise to unequal growth. However, some ranchers feel that two kits from a litter play and do better for a week or two in the same pen just after weaning.

A shed suitable for mink so that they will develop optimum quality fur should have controlled lighting and adequate ventilation. Other less important features are convenience of arrangement and height of the furring pens to facilitate cleaning and feeding operations.

Figures 1-3 of the furring shed in Plate V show the building in different phases of construction. Plate V, Figure 4, shows the shed with skylight windows closed as used during the furring season, while Figure 5, Plate VI shows these windows open permitting the sunlight to enter the shed. In Figure 6, Plate VI,

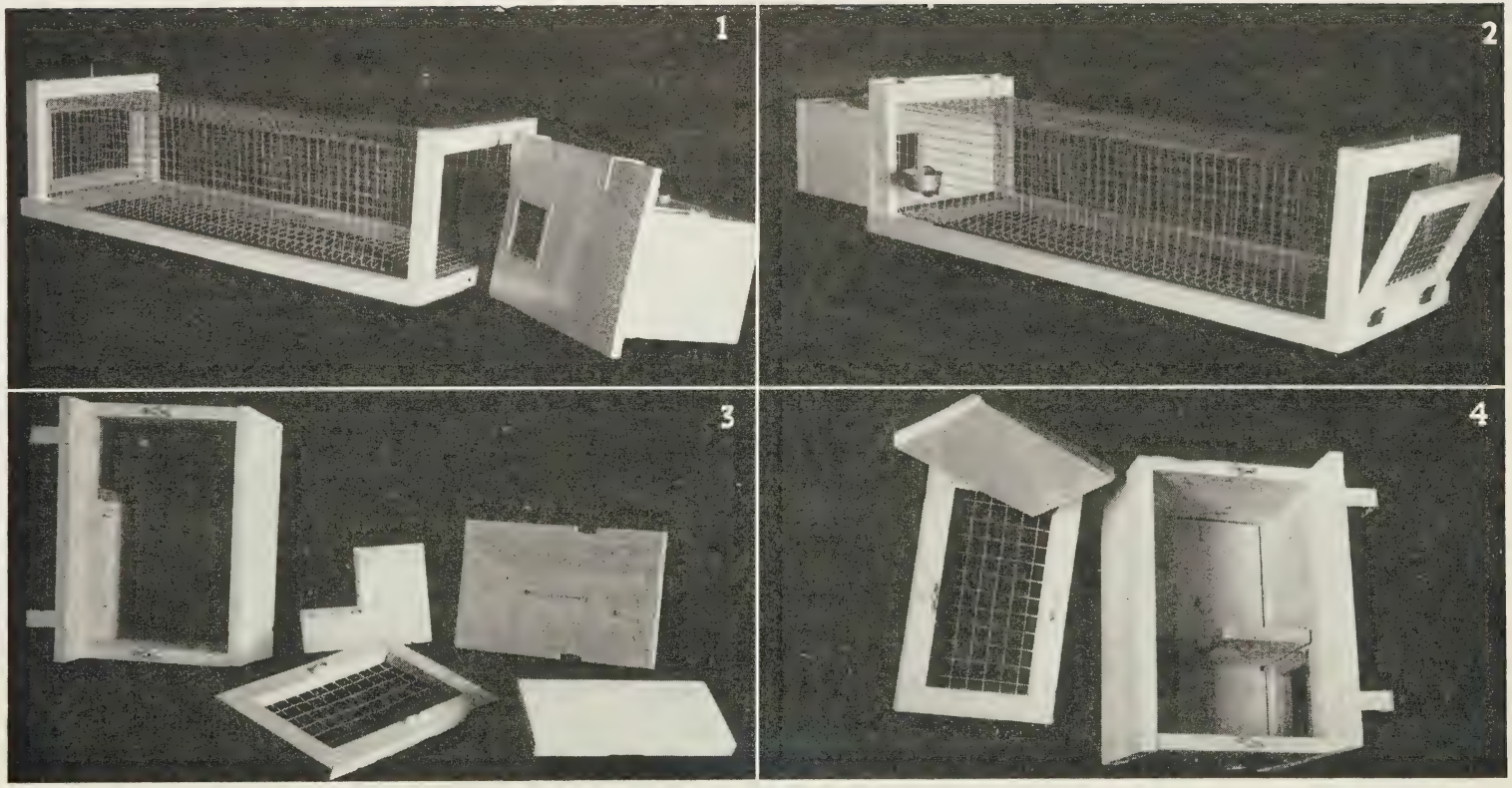


PLATE III

Figures 1-4 show details of construction of breeding pen and nest box. Figure 3 shows dissembled nest box. Figure 4 shows arrangement with wooden floor (over wire floor) and board separating nest from alley-way.

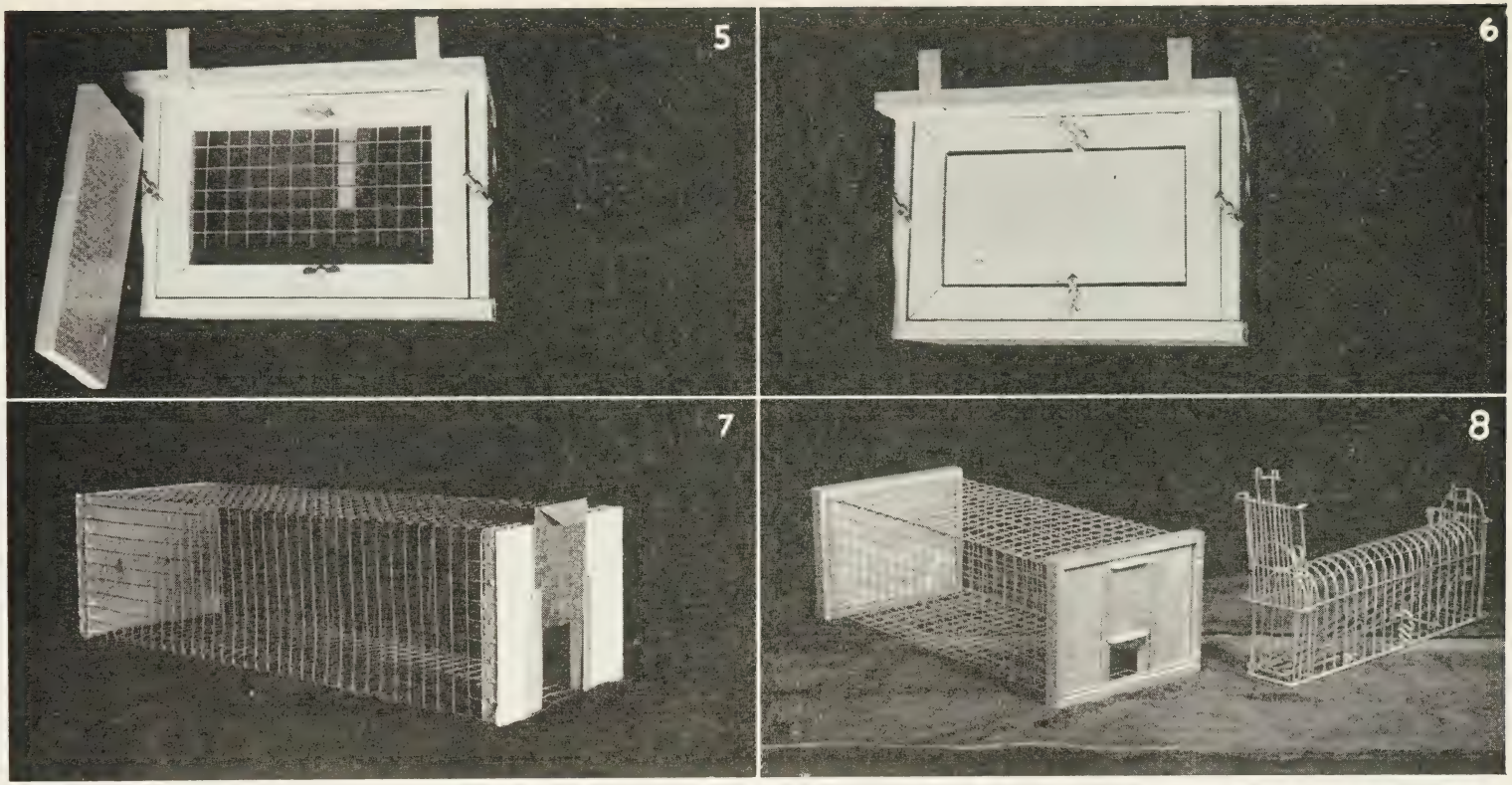


PLATE IV

Figures 5 and 6 show the assembled nest box and arrangement of lids. Figure 7 shows a furring pen with slide open. Figure 8 shows examining pen (left) and examining case (right), latter permitting direct contact examination of the mink's fur.

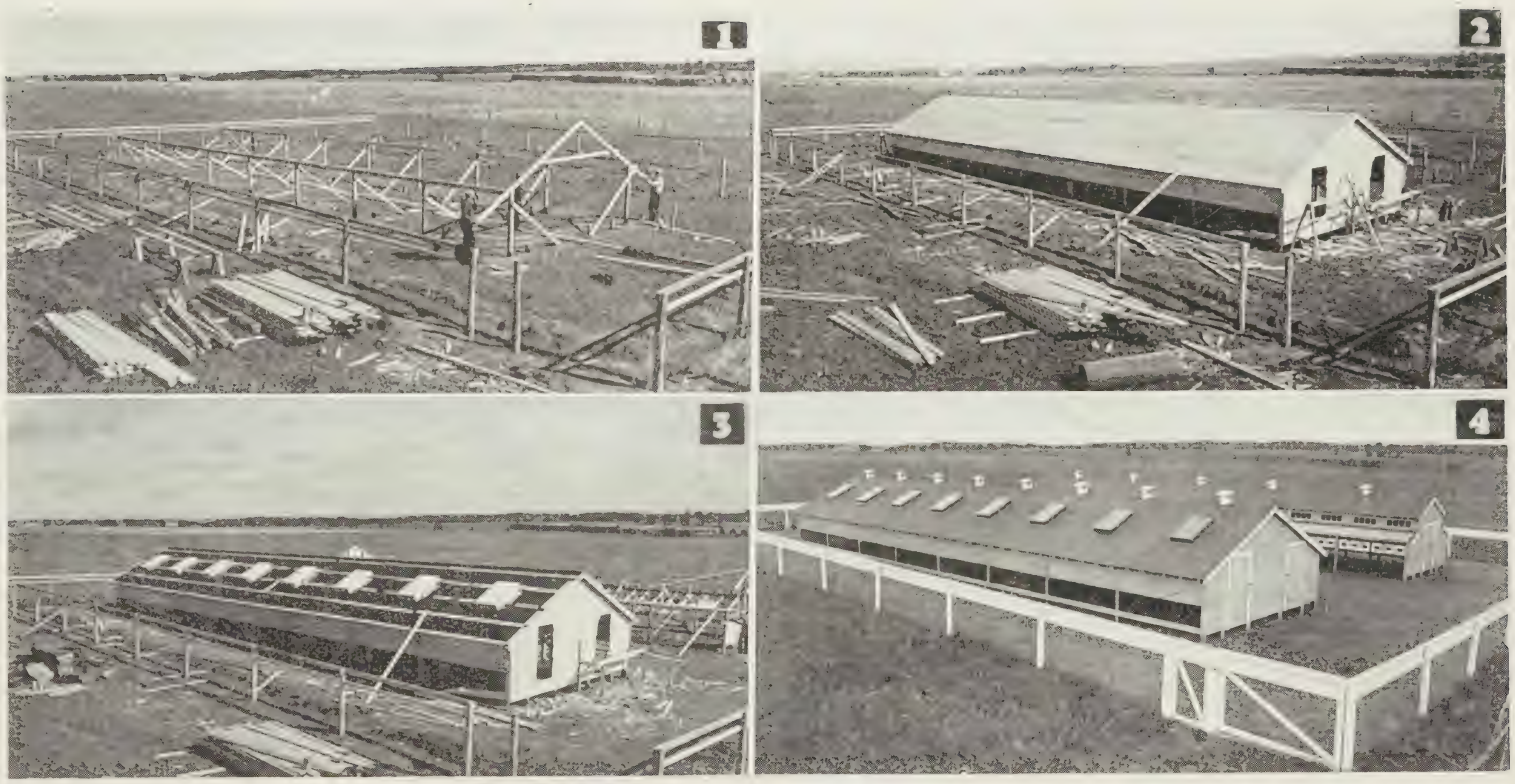


PLATE V

Figures 1-3 show construction of a mink furring shed. Figure 4 shows the completed shed with skylight windows closed.

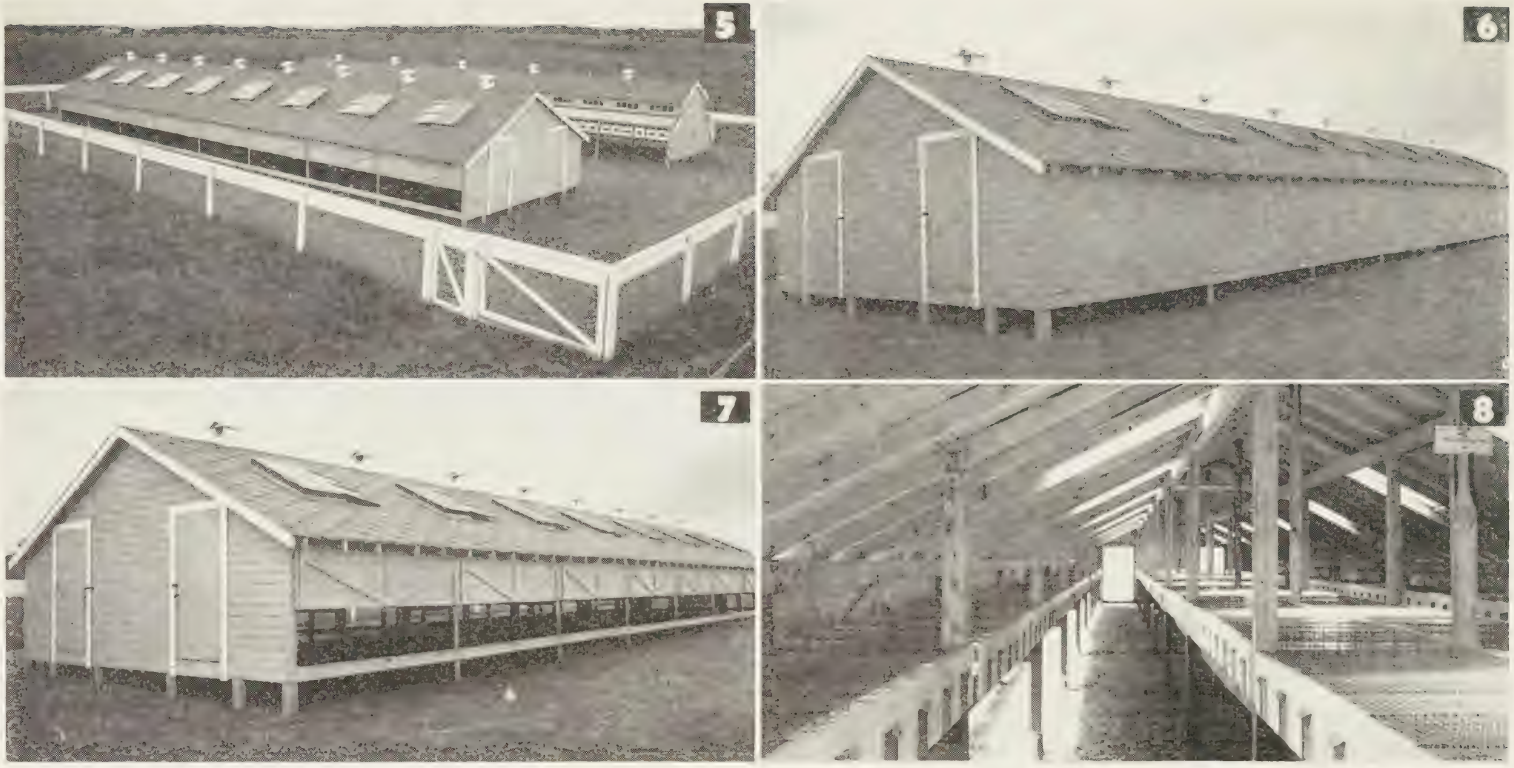


PLATE VI

Figures 5-7 show exterior views of furring shed while Figure 8 shows interior view of same shed. In Figure 5 the skylight windows are open; in Figure 7 the hinged shutters on sides of building are open.

the hinged wall shutters are closed, while Figure 7 of the same plate shows them open for increased ventilation. From Figure 8, an idea of the interior construction and arrangement of the furring pens may be obtained.

The following is a list of the materials for the construction of a furring shed, twenty feet wide and fifty feet long:—

LIST OF MATERIAL FOR MINK FURRING SHED (20′-0″ x 50′-0″)

Item No.	No. Pieces	Size inches	Length Feet	Description	Feet B.M.
1	12	6″ diam.	7′-0″	Cedar posts for side wall, embedded 2′-6″ in ground and squared to 4″ x 4″ above ground.	.....
2	24	6″ diam.	2′-0″	Cedar posts under studs embedded 3′-6″ in ground	.....
3	42	2 x 6	10′-8″	Cage supports (40 required)	420
4	6	2 x 6	6′-0″	Tie below cage supports at centre rows of pens	36
5	2	2 x 6	14′-0″	Tie at each end of building	28
6	14	2 x 6	10′-0″	Frames for skylights (to cut 40 pieces)	140
7	42	2 x 6	10′-0″	Plates (40 required)	420
8	3	2 x 8	12′-0″	To cut 10 pieces, 3′-0″ long, to be bolted to rafter to hook shutter to, when open	48
9	26	2 x 4	6′-6″	Studs, doubled to make 4″ x 4″ to carry cage supports for row of pens at side walls. (24 required).	113
10	26	2 x 4	8′-0″	Studs, doubled to make 4″ x 4″ to carry cage supports next to alleys to inside rows of pens. (24 required).	139
11	6	2 x 4	8′-0″	Studs, single, hung from rafters between centre row of pens	32
12	54	2 x 4	12′-0″	Rafters (52 required)	432
13	10	2 x 4	10′-0″	Frame for doors in end wall	67
14	16	1 x 6	14′-0″	To cut 26 ties, 7′-0″ long, and 1″ x 6″ removable board below door.	112
15	.....	$\frac{7}{8}$ x 6	.....	T & G roof sheathing	1,500
16	.....	$\frac{7}{8}$ x 6	.....	T & G wall sheathing	360
17	.....	$\frac{7}{8}$ x 6	.....	T & G side wall sheathing	360
18	.....	$\frac{7}{8}$ x 6	.....	T & G sheathing for hinged shutters on side walls, skylights and for doors.	450
19	.....	1 x 4	.....	Battens and trim, 580 lineal feet	194
20	.....	1 x 10	.....	Battens on bottom of doors, 12 lineal feet	10
21	.....	2 x 3	.....	Cover strip on skylights, 40 lineal feet	20
22	.....	$\frac{7}{8}$ x 4	.....	Cover strip on skylights, 60 lineal feet	20
23	.....	$\frac{7}{8}$ x 3	.....	Cover strip on skylights, 75 lineal feet	19
24	13	only	.....	Squares, shingles or roll roofing	.....
25	10	only	.....	Sash for skylights, similar to greenhouse sash	.....
26	5	only	.....	Ventilators, 8″ x 8″ inside	.....

Mink Furring Pens

The furring pen, Plate IV, Figure 7, is of simple design with a sliding metal door at one end. Its dimensions are 3 feet long, 12 inches wide and 10 inches high. The furring pens are supported on a wire (No. 9 gauge) tightly suspended two inches above the sharpened permanent supports for these pens in the furring shed. This arrangement serves, by reducing the area of contact between the pen floor and its supports, to prevent the droppings from adhering to the floor of the pen where it makes contact with the supporting wires. During the autumn months when the weather is cool, some ranchers find it a good plan to suspend half of a clean jute bag from the roof of the furring pen, in which the mink wraps itself for added warmth. Care must be taken that the bag does not get wet with urine, however, or the fur will become stained. The arrangements of these pens are shown in the shed in Figure 8, Plate VI.

The following is a list of the materials required for construction of 100 mink furring pens:—

LIST OF MATERIALS FOR 100 MINK FURRING PENS

Lumber—1 x 10 Ends for mink furring pen, 220 lineal feet, 183 ft. B.M.
Wire —1,150 sq. ft. 26″ wide. 1″ sq. mesh, galvanized wire of 15 or 16 gauge for mink pens.

Galvanized iron for sliding door on mink pens is not included in the above list.

SELECTION OF BREEDING STOCK

In mink breeding, it is necessary to have a mental picture of the ideal type of mink that one is striving to obtain.

Standard Dark Mink

An ideal standard dark mink for breeding stock would be expected to have the following attributes:—to be of large size, to come from a prolific strain; to be a good feeder; to come from a strain easy to keep in good condition; to be free from such habits as tail sucking, tail chewing, weaving, etc.; to be from a strain in which the fur does not fade much during the summer months; and, preferably, to be from a uniform linebred stock with the same good characteristics generally evident as are outlined for this ideal specimen. Where adult animals are in question, their breeding vigour and the quality of their progeny are of great importance in the final analysis of merit. In selecting breeders, avoid mink which have an abnormal behaviour pattern, such as "Screw Neck", a characteristic but abnormal rotation of the head of the mink.

In such an ideal specimen of mink, the prime pelt should have dense soft fur of fine texture, with a medium length nap (guard hairs one half longer than depth of underfur). That is, underfur of medium nap mink, the most desirable on the fur market, is approximately half an inch long and the guard hair approximately three quarters of an inch. The guard hair should be sufficiently dense to cover the underfur without any breaks in the fur. With underfur, density is paramount. Clear colour, with either blue or slate cast, is essential in the underfur and any brownish or reddish cast is undesirable. Particular attention should be taken to see that the underfur is not banded or faded off-colour at the tip, which is highly undesirable as it shows through the guard fur detracting from the clearness of the general colour of the pelt.

Colour is extremely important and even a well furred mink or pelt will be discredited on the show or sale table if it is off-coloured upon examination of the fur. The tips of the guard hairs should appear in an even sequence when the mink is viewed from the side. That is, some of the guard hairs should not be long and others shorter, giving the outline of the fur an uneven contour, or "spiked" appearance, as it is called in the trade.

Some mink are undesirable because their guard fur has an uneven or patchy development over the body, which gives the fur, upon close examination, a mottled effect. This results from the underfur showing up more prominently in areas where there is a deficient growth of guard fur.

It is important to note that although the manufacturer of mink garments will pay a premium for large sized mink pelts where the quality is comparable with that of fine textured smaller pelts, nevertheless, the mink rancher should not select for size at the expense of texture and quality of fur which are factors of prime importance. However, if the individual mink rancher expects to produce fine quality pelts, he should follow a strict program of continuous herd improvement and cull any mink in the ranch which do not measure up to the highest standards.

The dark coloured mink bordering on blue-black are most desirable. A change is taking place in present-day evaluation of the colour of mink fur, however, in that clearness of colour is exceedingly important. That is, even lighter coloured, but clear pelts, are more acceptable than dark skins having a reddish or yellowish cast. Therefore, the most desirable pelt is of large size, extra dark, clear coloured, medium nap with fine texture, dense underfur of blue cast and sufficiently dense guard hair to cover the underfur without any breaks in the fur. The beginner would be well advised to obtain his original breeding stock from a reliable mink rancher who is already producing the type of mink

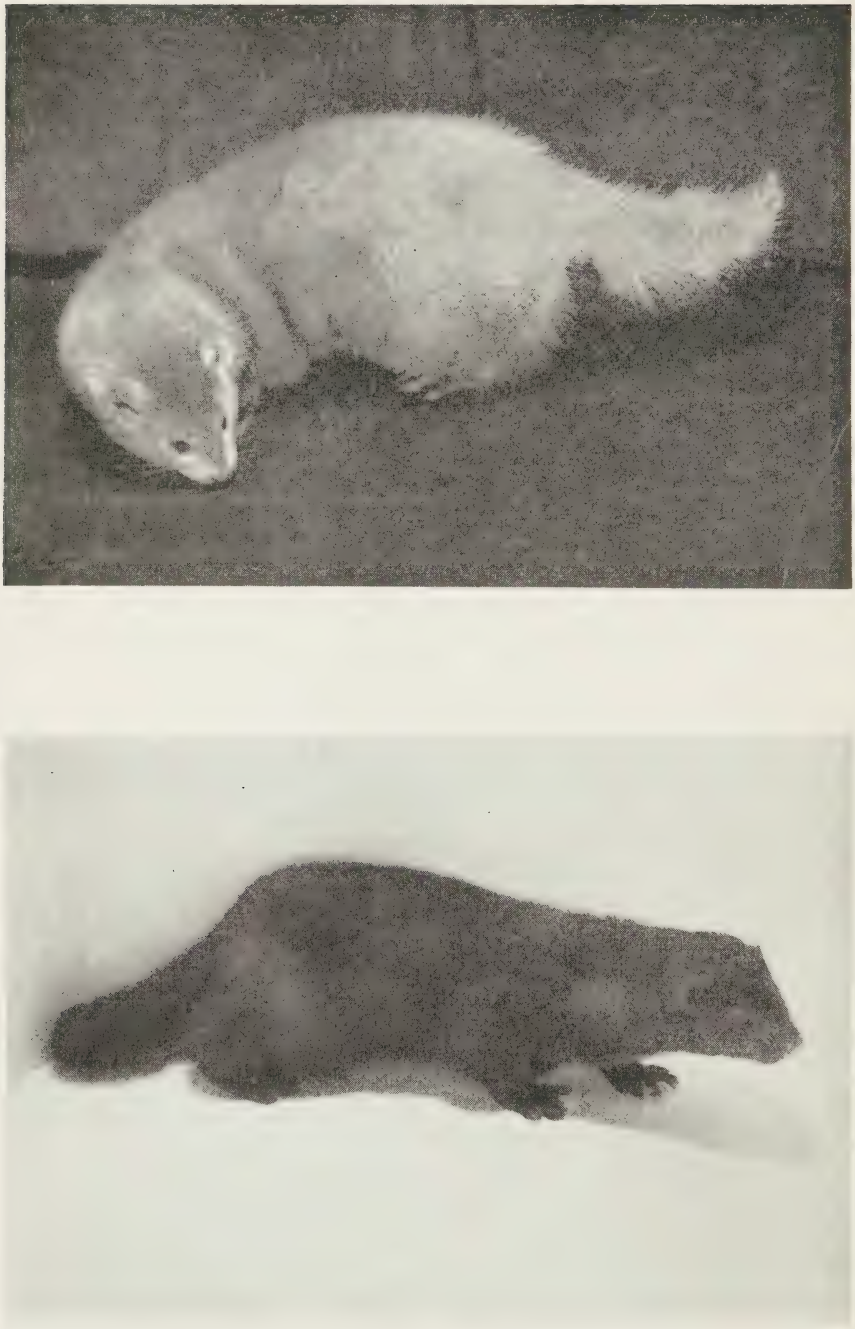


Fig. 2—Silverblu mutant mink (above); Royal Pastel mutant mink (below).

the market desires, rather than depend too much upon his ability to select mink which he thinks, from his initial study and observations, may be the market type.

With respect to the different strains of Standard Dark mink, it should be kept in mind that such names as Two-tone, Kenai, Yukon, Kobuk, Blue Diamond and Azur Blue are famous strains of Standard Dark mink and are not to be confused with the mutations showing typical Mendelian heredity.

As may be seen under the section dealing with Genetics of Mutation Mink, the Standard Dark mink is recessive to the dominant mutant types, but dominant to the recessive mutations. From a genetical standpoint, it represents what is known as the "wild type" mink.

New Type Mink

In regard to the selection of mutant type mink for breeding stock, the same close attention to the quality of the fur in these animals is required. It is only through the development of large, fine furred, mutant type animals of the desired colour, that the new mutant type mink can hope to hold a permanent position of esteem and high market valuation in the future of the fur garment trade.

In all mutant type mink, dense clear coloured underfur of bluish cast is desirable. The valuation placed upon the particular coloration of a given new mutation, or new type mink, resulting from a new combination of two or more mutant types, in the future will be determined by its particular beauty as used in the manufacture of luxurious mink garments.

The beginner in the field of mink mutations would be well advised to remain content to breed mutant types of already proven worth on the fur market. It is often a costly gamble to develop a new type animal, without the assurance of final acceptance by the market of such a new type mink pelt.

Figures 2, 3, 5 and 6 show examples of standard dark and mutant type mink.

Detailed descriptions or photographs of such mutant mink fail to portray the actual beauty of these animals. Especially is this the case with the beautiful pastel and Aleutian mutations, and other blended new type mink. The prospective beginner in this field of mink ranching can acquire a fair knowledge of the relative values of beauty and quality of such animals from expert fur graders and manufacturers of mink fur garments or by attending mink shows and visiting ranches where such animals may be seen. They should be examined in a catching box or examining pen, both of which are shown in Plate IV, Figure 8. Here they should be studied under conditions of shade and sunshine, as well as in closer proximity where the actual texture of the fur can be felt and a closer inspection of the colour and density of the underfur of these beautiful mink can be made in much greater detail. Usually at fur shows these mink are classified into dark, medium and light colour phases.

MINK BREEDING

Under this general heading are listed (*a*) mating procedure; (*b*) methods of breeding mink to obtain desired fur qualities, such as linebreeding and inbreeding, and (*c*) the genetics of some mutant types of mink.

Practical Breeding Methods

Several strains or varieties of mink are recognized in Canada, which are regarded as distinctive types of the mink species, *Mustela vison*. Their classification is based upon their geographical origin. (See map, page 3). Two or three strains are parental stock for most of the Canadian ranch-bred mink. These

are the Eastern strains of Quebec and the North Western strain. The former strains are somewhat smaller animals and have fur usually of finer texture than that of the North Western and Yukon strains.

The breeding season for all strains of mink is approximately the same. It takes place during the month of March and may extend to the first week of April. Quebec mink, including Labrador strains, come in heat about the first week in March, while the Yukon and North Western strains are approximately 10 days later.

Conditioning of Mink Previous to Breeding Season

Getting the mink in proper condition with respect to body weight just prior to the breeding season is important.

Overfat males and females usually mean poor kit production and poor working males. The mink should not be too fat when the breeding season arrives. Their condition can be denoted when they run up the wire. The mink should appear full between the hind legs and have a square plump appearance on the lower belly region, but there should be no distinct roll of fat that bulges out.

If the mink are overfat in February, omit the feed one day per week and cut down on the amount until the animals reach the right condition. By starting one month before the breeding season to note the condition of all breeders, it is a fairly simple matter to spot the overfat ones and also any that may be underweight. Thus, the amounts of feed can be adjusted for each animal according to its condition.

Mating Procedure

In mating procedure the male is usually taken in a catching box or in a removable nest box to the female's pen, except in the case of an untried young male when it is often preferable to take the female to his pen. Some time is saved in taking female mink to the male pen, but usually it is easier to train the smaller number of male mink to get in the catching box.

Where a removable nest box system is used, it is preferable to take all females to the males and to have a wooden floor placed in their pens. This eliminates the possibility of injury to the penis of the males which sometimes occurs with wire floored pens at mating time.

It is easier to obtain matings from old experienced male mink, but this practice may retard herd improvement if the kit males available are of superior fur quality to that of the old male. Accordingly, time should be taken to get the young males to mate in order to take advantage of the opportunity for ranch stock improvement by the use of such males.

Although the number of non-pregnancies among kit females is thought to be greater than with older females, the litters from kit females are just as large as those from adult females. Accordingly, there is good reason for using young females where their fur quality is superior to that of the parent generation. Furthermore, young females are easier to get mated than adult females, although they usually come in heat later in the breeding season. It is usually unwise to keep female mink more than four or five years.

Young males, sexually underdeveloped, may be slow breeders. Therefore, it is important that such males be handled carefully until they have had one or two successful matings. A good plan to get young males initiated is as follows:—

1. Place a young female mink with a kit male the day after this female has been mated to another male. The œstrus period in mink usually lasts two days, and the female is usually quite tractable the second day of heat, after having been mated on the previous day.

2. Place a young female mink with a kit male immediately after it has been determined she is in heat by the use of another old male. When the older male has demonstrated that he can catch the female by the nape of the neck and begins to ride her, the operation should be interrupted and the female taken to the pen of the kit male.

A female may come in heat from one to four times during the breeding season at intervals of about six to eight days apart. Therefore, one procedure is to try females with males every other day until a successful mating takes place. (However, some ranchers prefer to leave difficult females for an interval of five days before trying them again.) Then the female may be mated again the next day if male animals are plentiful, or she can be tried again six days later and every other day after that period until the 14th day, at which time if she has not accepted a second mating, she is usually pregnant.

Matings which occur during the last two weeks of March are often more productive than those taking place earlier in the breeding season. Therefore, many experienced mink ranchers use their best sires just once on each female at the later date in order to be able to spread their desirable qualities through the ranch to a greater extent and with the greater assurance of obtaining litters. However, non-pregnancies may be higher among single mated females than among those mated two or more times.

Occasionally, a female mink will accept service from a male, after just having strenuously refused a previous male, in this manner showing a selective preference for her mate. Therefore, a female should not be considered as not in heat if she has not been tried with more than one male mink. The female mink, when in heat, will allow the male to catch her by the nape or back of the neck, and to mount her for copulation. However, it is important that the attendant should watch the pair, preferably from some secluded part of the ranch 20 to 30 feet distant in the case of shy maters, to determine whether or not a true mating takes place. This can be detected by the following actions:—

1. The male animal assumes a position in which his hind feet are projecting slightly off the ground.

2. The back of the male from side view assumes a sharp bend in the form of an inverted "U".

3. The pair roll on their sides and may move about the pen, but always locked together.

The two mink in the act of copulation may remain coupled together for 15 minutes to 2 hours, with an average period of about one hour. Long matings are, however, not a criterion of fertility and some breeders terminate matings after 30 minutes in order to conserve the male.

Some adult male mink can service as many as three females per day, that is, using the male at intervals during the morning, at mid-day and in the late afternoon or evening. However, such frequent use of a male makes it necessary to limit mating periods to half an hour. Two services per day, however, are a good average number, and in the case of a male kit, one mating every second day is sufficient. On the average a kit male may mate 2 to 4 females while an adult animal may have as many as 25 to 30 single matings in a breeding season. Beginners in the business are advised to be content with one mating from each male mink daily.

All males should be tested for fertility at the beginning of the breeding season. This is done by taking a smear from the vagina of the female mink immediately after the first mating of the season for that particular male. The presence of an abundance of normal shaped, active spermatozoa in the smear (when examined under a microscope of 200 magnifications) is usually accepted as evidence that the male mink in question is fertile.

To maintain fertility in male mink which are being used extensively, they should not only receive fresh water and their regular daily ration well spaced between the periods of mating activity, but some ranchers also give an extra feed of a small piece of liver, about an ounce daily, and 1 raw egg to every three male animals. Other ranchers feed the male mink just after each copulation. This prolongs their production of larger numbers of spermatozoa during the breeding season.

One outstanding rancher uses the following system:—As soon as the male has finished mating a female he feeds a half yolk of an egg mixed with an equal amount of mink meal and as soon as this is eaten he gives a ball of regular feed the size of a hen's egg. The rancher has noted that the mink then crawls into his nest to sleep and that when he shows out again he is usually ready for his second mating. This rancher has also observed that if his males are not fed after service they frequently run up and down the pen.

At the beginning of the mating season, if a female fights off the male, but no dangerous quarrelling is apparent, the pair can be left together from 20 to 30 minutes for the first trial of the season. In later trials it will be possible to detect whether or not the females are in heat in 10 to 15 minutes. A careful record should be kept of such mating trials of the different female mink.

When a difficult female mink has almost reached the end of the breeding season and has been tried every second day but without having accepted service, a fertile mating can sometimes be obtained by placing her with several males, one after the other, until she is tired out. Then copulation may take place with possibly the sixth or seventh male used in such a gang procedure. Particular care should be taken toward the end of the breeding season that old males do not act too savagely with the females and bite them excessively or even kill them.

SOME CAUSES OF DIFFICULTY IN MATING MINK

1. Pup males may not be aggressive enough, or may antagonize the females, making them very difficult to mate. The result is that few females in the ranch may be mated by such pup males. It is usually unwise to expect more than 2 or 3 matings on the average from a male mink in its pup year. If pup males fail to mate several females, it is wise to try an aggressive proven breeder adult male mink before concluding that the female mink have not come in "heat".

2. Both male and female mink that have been overfed and are too fat may show very sluggish or no mating tendency.

3. Mink housed indoors in a dark shed throughout the year may not come in "heat".

4. Where mink are housed in a building where electric lights are used at feeding time in the winter evenings and to look after the mink in the evenings, the change of normal light rhythm (length of day) may upset the process of œstrus in the mink and they may fail to come in "heat".

5. According to the season mink may come in heat earlier or later. The usual season is from March 7 to April 7, but this varies also with the breed. Eastern strains come in heat approximately ten days earlier than North Western or Yukon strains.

6. Low-grade food poisoning, from infected fish or meats, may prevent normal mating activity. Fish held too long in storage is dangerous in this respect.

7. Mink parasitized with fleas or internal parasites frequently fail to show normal mating activity.

Fig. 3—Standard dark mink (above); Green-eyed Pastel mutant mink (below).

40681 5½

8. Dietary deficiencies may cause mink to fail to breed normally. For example, anaemia (called acidosis) caused by insufficient liver (less than 5 per cent) in the ration is an important factor in this regard.

9. Vaccinated mink have been known to fail to breed normally as a result of some extraneous (latent) infection resulting from the vaccination.

10. Highly inbred mink may show loss of mating vigour and become difficult to mate.

11. Mink moved to a ranch where environmental conditions of diet, light and housing are different may not breed well until they become thoroughly accustomed to the new conditions.

REMEDIAL MEASURES

1. Obtain aggressive proven breeder adult males.

2. Reduce the feed to 50 per cent the amount fed if the females are too fat.

3. Use a gang-up method with six or seven males one after the other on cranky females which have not mated at the end of the breeding season.

4. Clip the fur from around the vulvae of very heavily furred animals.

5. Inject female mink with female sex hormone intramuscularly in the thigh and try them every day afterwards for a week with aggressive male animals.

The gestation period for mink varies from 40 to 70 days with an average duration of from 48 to 52 days. The variation of the gestation period is thought to result from delayed implantation or arrested development of the young embryo. It is often difficult to decide which female mink are pregnant and frequently those females showing definite signs of bearing offspring may have the smallest litters. The first indication of birth is usually the whimpering of the young kits in the nest box which is quite a normal phenomenon. The female mink will usually fail to eat her feed that day and it is wise to give her a light feed on the following day. If this feed is completely eaten, the regular feeding schedule may be resumed.

The rancher should wear the same clothes and have the same daily routine system of feeding during the gestation period to which the pregnant mink will become accustomed. Strangers should be strictly excluded from the ranch during the whelping season and for a period of three weeks after the kits are born. At that time the litters may be examined to determine whether or not all is going well. It is not advisable, however, to examine the kits before that time unless a female is acting abnormally. This may be detected by the fact that she does not eat her feed or she may be seen carrying the young around the pen. Also, if the kits are not doing well and are noticed to continually whimper, then the probable cause of the trouble is that the mother is not supplying them with enough milk. The nest boxes should then be examined and the kits distributed to other lactating females to suckle. This procedure is usually quite successful if the rancher wears a new pair of clean cotton gloves and rubs them with some dirt from the pen to which the transfer is to be made.

The number of mink kits in a litter may vary from 1 to 10 with an average of 4·25 to the litter. The general average production for females kept ranges from 2 to 2·5 kits.

When the kits are 3 to 4 weeks old they begin to suck meat and by the time they have reached 8 to 10 weeks of age they can be weaned and placed in a separate pen. Some ranchers prefer to wean at 5 to 6 weeks of age, when the kits are eating well and there is danger of nursing sickness in the females. This is especially advisable where the mother appears to be in poor condition.

In the case of large litters it is sometimes advisable to leave one or two kits to suckle the mother for a longer period of time so that her mammary glands do not become congested with milk.

Scientific Breeding Methods

In animal breeding, "like tends to beget like" but no two individuals, excepting identical twins, are exactly alike. Although litters of mink may look alike, the experienced rancher will readily make his selection for breeding stock among the litters, based on the differences shown in their fur quality.

These are small variations, resulting from the rearrangement of existing hereditary factors, already present in the zygote of fertilized egg. There are also other greater hereditary changes or variations which occur in mink, known as mutations.

The difference in fur quality with which the mink rancher is dealing when making his selection of breeding stock on the basis of their desirable fur characteristics, result chiefly from the numerous small variations affecting colour, length, density and texture of fur. The methods of breeding mink, to propagate and obtain desired types of fur quality, are dealt with under the subject of "linebreeding" while the abrupt inheritable changes called "mutations" are examined under "Mendelian inheritance". The third cause of variation in mink is environmental in origin and is not transmitted from parent to offspring. The latter, for example, may result from the effect of diet or of mutilation.

BUILDING A HERD OF IDEAL MINK

The problem the mink rancher must solve is how to transmit all or most of the desirable characters of the ideal type of mink to its progeny. It is a good plan to select ideal animals among the male mink because these enable more rapid dissemination of good characters in a mink ranch.

The most important character the mink rancher can select for is fecundity, that is, the hereditary ability to produce large litters. If a rancher does not get good average litter size, he will not succeed financially. This character can be attained by selecting for breeding stock only mink from large litters. Then it becomes necessary to make a further selection for good fur qualities among these future breeders which have already been chosen from the large litters. Some ranchers, however, prefer to select for fur quality first and then for fecundity among their animals. However, there is the temptation here of retaining animals of poor mating vigour and production is soon low in the ranch.

Five methods of breeding are available to the rancher who wishes to improve body size and the colour, density, length and texture of the fur. These methods are:

(1) Simple selection, (2) mating like to like mink, (3) mating unlike to unlike mink, (4) linebreeding and inbreeding or mating of related mink and (5) outbreeding or mating of unrelated animals.

Much might be said for and against the use of any of these methods of animal breeding when they are used individually. While individually they have definite weaknesses, when these methods are used in combination it is possible to preserve the good attributes of each and eliminate, for the most part, the weak points. Such a combination is "linebreeding" which embraces to good advantage several of the above breeding systems.

GRADING UP MINK

Where a rancher has a few average mink in his ranch he can grade up his stock by acquiring an outstanding male animal of the same strain of mink as his own and crossing him with the best females. When a few good animals have been obtained by this procedure, or by the further purchase of a trio of good mink, a mild linebreeding program may be inaugurated.

LINEBREEDING MINK

Linebreeding may be defined as a modified form of inbreeding, in which the breeding is mainly directed toward the concentration of the desirable hereditary characteristics of one or more outstanding ancestors. As a result of the inbreeding practised in this method of breeding, the good and bad characteristics are both brought to the surface, and so the true breeding worth of the mink can be readily assessed. However, since linebreeding concentrates both the good and bad characters, it becomes particularly urgent that a rigid system of culling be practised to eliminate the off-type animals from each generation.

If linebreeding is attempted with mediocre or low-grade fur qualities at the beginning of the program, then it is not economically sound, because of the high percentage of poor quality mink kits in the initial stages of this system of breeding. Hence, it is inadvisable to initiate a program of linebreeding with only inferior stock.

INBREEDING

In Figure 4 (right) has been shown the outstanding male as being mated to three unrelated females—and this is a good practice in linebreeding, as it reduces the inbreeding involved. In fact, that is the chief difference between straight inbreeding and linebreeding, namely, that with inbreeding we concentrate the heredity of both parents, (See Figure 4 (left)) whereas in linebreeding only the heredity of one ancestor, usually the male line, is intensely concentrated from generation to generation, somewhat at the expense of the maternal hereditary characters. This procedure prevents too many defective recessive traits from becoming fixed in one generation and overshadowing the good characters, because there are very few animals that do not carry some undesirable recessive traits. However, the greater the amount of inbreeding that can be practised without undesirable effects upon the fur of the progeny, the more quickly we can fix or concentrate the good inheritance of the desirable ancestors, and the greater the prepotency produced in the offspring.

PREPOTENCY

By the term "prepotency" is meant, the ability of a particular animal usually a sire, to transmit or impress its hereditary traits upon its offspring to a greater extent than another animal of equal merit (based on appearance of fur characters) but of mongrel ancestry. Therefore, in purchasing live mink for breeders, it is advisable to study the pedigree and to determine whether the animal has been linebred in its production—because linebred animals usually have this quality of "prepotency" which is very desirable in rapidly improving the quality of mink. This is particularly important if a male mink is being purchased for the purpose of grading up an average mink ranch.

UNIFORMITY OF TYPE

The numbers opposite the succeeding generations of mink in Figure 4 (right) are arbitrary numbers placed there to suggest the fact in passing from succeeding generation to generation in a linebreeding program, the number of desirable type mink which conform to the ideal sire will increase. Possibly only one in each litter of four conforms to the ideal type in the first generation but in passing to the second and third generations this will increase to two, three and four kits in the litter,—i.e. the uniformity of type of animal produced by linebreeding is gradually being increased. The importance of uniformity is

readily appreciated when it is noticed that fur buyers are always willing to pay more for bundles of uniform type mink pelts, than for those in which there is considerable variation in the kind of pelts.

FIXING GOOD CHARACTERS

In a linebreeding program, the hereditary factors, determining good and bad characters in mink fur, can be compared to a pack of playing cards, from which at each generation so many hands are shuffled out, representing the hereditary constitutions of the progeny in each successive generation. First, the low cards (undesirable heredity), say the twos, threes, fours, and fives in the first generation are culled from the pack, followed by the sixes, sevens and eights in another generation until, with each generation, the further less desirable characters, or cards, are culled out, leaving only the face cards. That is, the undesirable characters through three or four generations have been eliminated and now nothing but face cards or desirable hereditary characters in the progeny can be obtained—which is the reason for increased uniformity in a mink stock after a few generations of careful linebreeding.

IMPORTANCE OF SELECTION OR CULLING

It is important to note that when inbreeding is practised in each generation, only those animals are selected which conform to the ideal type. As a result, the good and bad characters are brought to the surface, thereby illustrating the relative merit of the breeding worth of these mink. Thus when a mink is selected which has the characters of the ideal type in linebred stock, the hereditary factors are actually being selected which underlie the characters producing the good fur. The characters sought are those which result in production of the good fur carried by the ideal type. With linebred animals, there is greater probability of the external appearance of desirable fur characters being the result of hereditary factors, or combinations of these factors, than of pure chance.

Note the word "combination" which may represent an hereditary trait resulting from two, three or even more of these hereditary factors. Inbreeding incorporated in a system of linebreeding is the best known method for transmitting hereditary characters dependent upon the intact transmission of the required grouping of the factors for such a trait.

LIKE PRODUCES LIKE

In conjunction with the foregoing advantages of linebreeding, the percentage of heredity can be increased to a much higher concentration than 50 per cent, such as found in sons and daughters. Thus it is possible, in a program of linebreeding, to produce mink which are even more like the original sire of the line than his own sons and daughters. This is one of the great advantages of the system. Once an outstanding sire is produced it is quite possible that many more animals very similar to him may be produced, and the gains made in the selection from the outstanding sire can be held while other good attributes are gathered in from the maternal side of the mink stock.

It may be seen from what has been said about linebreeding, that it is a combination of four of the possible five fundamental methods of breeding animals. First of all, linebreeding incorporates the mating of like to like related mink; second, it involves selection of good type animals; third, it utilizes a form of inbreeding; and lastly it requires that an occasional outcross be introduced into the program.

OUTCROSSING

Occasional outcrossing is necessary because of the fact that a decrease in size, mating vigour or fecundity, may co-exist and become apparent in the stock which has desirable fur characteristics. If this occurs it may be presumed that the defect is possibly linked with some of the good characters. The remedy then is to cover up the defective trait by suitable mild outcrosses. A good practice, in making such an outcross, is to select an outside male of good fur quality (preferably one which is strong where your own stock is weakest) and to cross it with three or four females to find with which of these it "niches". Then its progeny may be introduced into a linebreeding system, which line may already have some common blood received through their dams.

The necessity of occasionally introducing an outcross to cover up the defective traits mentioned above is the chief weakness in the linebreeding system. The advantages of this method of breeding however, may be summarized as follows:—

1. It enables the breeder to know that when he selects a mink with good fur quality, there is also a good probability of such a linebred mink giving kits of similar desirable fur characters.

2. It establishes "prepotency".

3. It enables a breeder to increase the likeness of his stock to the ideal type to a greater degree than if inbreeding were practised with the animal's own sons and daughters.

4. It brings about "uniformity" after a few generations of sound linebreeding.

5. It acts like a ratchet mechanism which holds its gains and can accumulate desirable characters from the maternal side as well as from that of the sire.

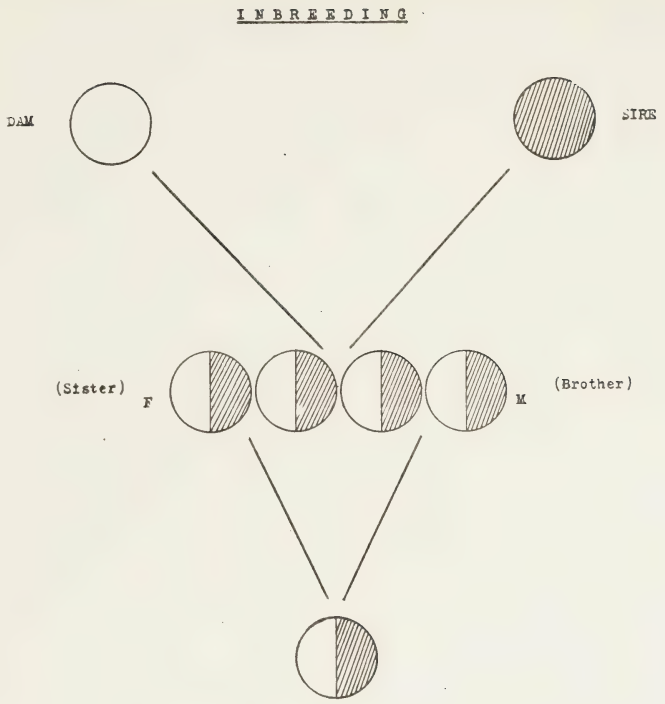
It is advisable to keep detailed records regarding each mink intended for breeding purposes so as to have a knowledge of (1) size (weight); (2) fecundity or litter size; (3) fur qualities—colour of guard and underfur, length of guard and underfur; (4) mating vigour; (5) eating habits; (6) nursing ability; (7) freedom from bladder stones, tail sucking, nervous traits, etc., in the strain.

This information is exceedingly useful in checking back on a pedigree to determine where certain good hereditary characters have been derived in a litter or the ranch in general. Thus the rancher can judiciously arrange his breeding schedule to disseminate the desirable traits through his ranch stock.

GENETICS OF SOME MUTANT MINK

A working knowledge of genetics is necessary to the rancher of mutant type mink. It enables him to intelligently mate these mink in such a manner as to get the desired progeny in the greatest numbers by the shortest breeding method. This information also enables the rancher to calculate the possibility of creating new type mink by combining the known mutations together as has been done to derive "Breath-of-Spring" and "Sapphire" mink.

In contrast to the small hereditary variations found in different kits within a mink litter or between the quality of fur of different mink of the same strain, the term "mutation" is applied to the large hereditary variations or changes which are often quite different from the standard dark or wild type of mink. Under natural conditions most of these changed forms are lost owing to the unsuitability of the new colours for adaptation to environmental conditions and also as a result of the promiscuous breeding habits of mink in the wild state. Under ranching conditions, however, many new colour mutations have been preserved by proper mating procedure, selection and inbreeding, and



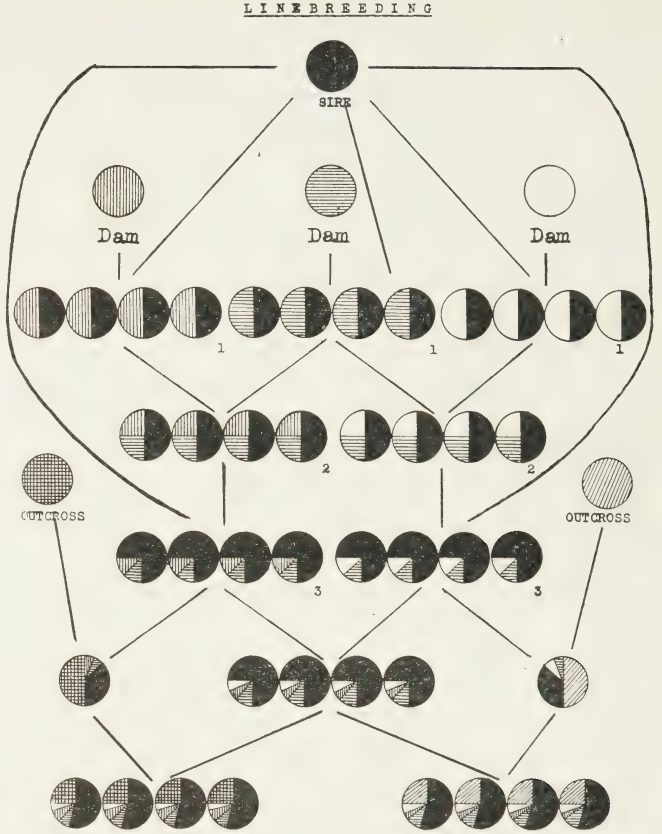


Fig. 4—Diagrammatic charts showing inbreeding (left) and linebreeding (right).

now there is a formidable list of mutant type mink and new combinations of these mutant types. A list of the better known recessive and dominant mink mutations are given below:—

RECESSIVE MINK MUTATIONS

Name	Genetic Formula	Synonyms
1. Silverblu	pp	Silverblu Platinum, Platinum.
2. Royal Pastel	rr	Marten, Blonde
3. Golden Cross	gg	Green-eyed Pastel, Hedlund Pastel, Golden Sable, Hedlund Pastel, Jones Pastel.
4. Aleutian Blue	ww	Waris Blue, Gunmetal Blue.
5. Arctic Snow White	c^hc^h	Albino White, Recessive White, Snowball.
6. Imperial Platinum	ipip	Marsh Platinum, Western Silverblu.
7. Gunmetal	mm	Steelblu.
8. Imperial Pastel	tt	
9. Recessive Blufrost	rbrb	West Coast Recessive Blufrost.

DOMINANT MINK MUTATIONS

Name	Genetic Formula	Synonyms
1. Kohinur	KK or Kk	Royal Kohinur, Black Cross, Noble-Taylor White Black Cross, Snow, Jibb Black Cross, Crown Jewel, Ingham Black Cross, Black Cross, Noire-Blanc.

(NOTE.—Dominance for the Kohinur mutation is not complete and the Kohinur hybrid or heterozygous form (Kk) shows less reduction of pigment giving the animal variable pigmented markings to a dark cross on its back. In the genetical formulae, for convenience of description, this type has been referred to as "Kohinur, Black Cross". Noble-Taylor White mink shows less pigmentation in the heterozygous form than the average black cross, possibly as a result of the presence of modifying genes, but they cross with the Kohinur mink, however, and are essentially the same mutant type).

2. Blufrost	Ss	Silver, Silver Sable, Sable.
3. Baldy	BB	
4. Blackout	OO	
5. Ebonyblu	EE	

In the manufacture of garments, many mink pelts are usually required for one article of wearing apparel. Because the pelts used in such garments must be of uniform colour type, mutant mink which show considerable variation in their colour pattern, or spotting, have not been received with the same favour as those of uniform colouring or self-coloured types, as they are called.

Accordingly, in dealing with mink mutations, the emphasis should be placed upon such self-coloured mutant types because of their probable greater acceptance in the future by the fur garment industry and, therefore, the mink ranching industry.

MINK MUTATIONS AND MENDELIAN HEREDITY

The kind of inheritance of the different mutant type mink is determined by making certain specific crosses in conjunction with a study of the kinds and numbers of different types of offspring produced. Such analytical crosses are:— (1) the mutant type mated with standard dark mink; (2) the mating of the

mutant mink together, (3) the mating among themselves of hybrid offspring from crosses of mutant and standard dark mink, (4) the crossing of such hybrids back to their recessive mutant parent; (5) the mating of the new mutant type with other mutant types.

From the progeny of this series of crosses, it can be determined whether the mutation follows the Mendelian type of heredity. The progeny also show whether the mutant animal is dominant or recessive in its manner of inheritance. Standards of expectation among the offspring of many mutant types, in other species of animals, already have been established, and accordingly much can be learned about a new mink mutation from the progeny test resulting from the above five particular matings when they have been carried out with adequate numbers of animals.

Breeding work, to date, with mutant type mink, shows that their manner of inheritance follows Mendel's Laws. To understand how such genetical laws operate in the breeding of mutation mink, a brief explanation of the process is given below:

A mutation (mutant gene) is transmitted from each of the parent animals to the progeny through the sex cells, the spermatozoa, and ova, within bodies located in these cells, called chromosomes, which latter carry the individual hereditary characters. The mink (*Mustela vison*) has 28 chromosomes in each body or somatic cell. Each of these heredity carriers, or chromosomes, is like a string of beads, in which each bead (or gene) is usually representative of a single hereditary trait, such as coat colour, eye colour or other inherited characters.

When, however, the germ cells are formed, only one complete set of 14 chromosomes goes into each sperm or ovum. Thus, when a single sperm and ovum unite at fertilization to give rise to a (zygote) mink embryo, the original number of 28 chromosomes is restored again, half the number (14) or one complete set of heredity carriers coming from the sire, through the sperm and the other half or complete single set (14) from the female mink, through the ovum. In this manner, every mink kit gets two complete sets of heredity factors, one set from each parent.

There are hundreds of pairs of genes on the 28 chromosomes, representing practically all the hereditary traits of mink. In Mendelian inheritance, such as is found in colour mutations in mink, usually there is only one gene or one pair of genes, changed to cause the mutation (that is strictly speaking, reacting with all the other genes in the animal and its environment). Therefore, in studying these mutations one can, for convenience in the formulae, temporarily ignore all of the other genes on the chromosomes except the pair of hereditary genes involved in causing the mutation. Mendel found, however, there are two kinds of hereditary genes, dominant and recessive. The dominant factors, as the name implies, suppress the recessive factors, and accordingly mink may be "carriers" of a recessive mutant factor without showing it, as is found for example in the dark hybrid carriers of the recessive Silverblu trait, commonly called Silverblu Starlights or half-bloods.

If one wishes to determine the kinds of progeny and the relative numbers of each that may be produced from particular matings, a simple genetical method with formulae is available. The example given below, and other subsequent crosses, should be studied carefully by the rancher *in order to understand the reasoning involved.* Then he will be able to work out other independent problems of his own in the mating of his mutation mink.

EXAMPLES OF CROSSES WITH RECESSIVE MUTANT MINK

Crosses where recessive mink mutations are involved all follow a parallel reasoning to that of the example of the Silverblu mutant type shown below:—

Example 1.—Cross of Silverblu Mink with Standard

Silverblu		mated to		*Standard Dark*
(Male or Female)				(Male or Female)
(Dominant)	—	Standard Dark	—	Capital Letter (P)
(Recessive)	—	Silverblu	—	Small letter (p)

(Capital letters are used to designate dominant mutations and small letters designate recessive mutations).

Male *Silverblu*	*Female* *Standard Dark*
Somatic or body Cells pp	PP
Germ or sex cells p	P
Sperm representing a Silverblu mink as sire contain p, the recessive gene for Silverblu colour.	Ova representing a Standard Dark mink as dam contain P, the dominant gene for dark mink colour.

	P
p	Pp

In the example shown above, it will be seen that the body or somatic cells of the sire and dam, each of which contain both sets of chromosomes, are represented by two capital letters "PP" (one letter for each set of chromosomes) in the dominant dark mink. However, when the germ cells are formed, a single set of chromosomes carrying one P goes into each germ cell. Similarly, the recessive Silverblu trait is represented by small "pp" one letter for each set of chromosomes in that parent. When sex cells, sperm or ova, are formed (haploid state) with only half the chromosomes going into them they have only one of such factors represented there by the letters p and P, accordingly, as they carry the recessive or dominant genes.

Therefore, there is only one kind of gene or factor for Silverblu colour on the chromosomes of the Silverblue males' sperms, the recessive mutant gene "p" while corresponding in the ova of the Standard Dark mink there is only one factor representing Standard Dark colour on the chromosomes of the females' ova, the dominant wild type gene "P". Accordingly, only one possible genetical constitution with respect to this trait, is possible for all the kits from such a mating, namely "Pp" giving rise to dark hybrids, Starlights of Silverblu half-bloods as they are commonly called.

Thus, all the offspring from such a mating are dark mink and no Silverblu or recessive mutant types are produced in this first generation from such a cross, because the dominant gene P for dark colour dominates or hides the recessive mutant gene p for Silverblu.

NOTE.—In all matings shown in this bulletin, the mutant mink may be sire or dam without affecting the proportion of different kinds of progeny produced. That is, the mutations are autosomal and not sex linked).

If two of the progeny from the former mating, namely, dark hybrid carriers of the Silverblu trait (called Silverblu, Starlights or half-bloods) are mated together, the percentage probability of mutant and dark offspring is as follows:—

Example 2.—

	Dark Hybrid, Carrier of Silverblu Trait.	×	Dark Hybrid, Carrier of Silverblu trait.
Somatic cells	Pp		Pp
Germ cells	P and p		P and p

(Note.—Each sperm cell has an equal chance of meeting with each ovum, thereby giving rise to the random chance percentages of the different kinds of progeny shown, since no linkage phenomena have been recorded to date between any of the known mink mutations. Instead of the usual genetical proportions of 3:1, percentages are used in this bulletin for the convenience of the fur rancher).

	P	p
P	PP	Pp
p	Pp	pp

75% Dark mink—PP and Pp
25% Silverblu mink—pp.

(Note.—For a recessive mutation to show in the fur, both recessive factors must be present in that mink).

Among the 75 per cent dark mink, two-thirds of them are carriers of Silverblu factor, and like their parents have the genetical constitution Pp, the remaining one-third PP are purebred or homozygous for dark mink. Since it is often impossible to distinguish the hybrids or half-bloods in the litter from the purebred Standard Dark mink, therefore, this is an undesirable type of mating to make, unless it is the only available means the rancher has to get a start with a new and valuable recessive mutant type of mink.

The most common cross in the production of recessive mutant type mink, especially where it is desirable to improve the fur quality of the mutant mink, is with desirable dark mink of a strain that niches well with the mutant for good fur quality, size, vigour, etc. The first generation of such dark hybrids is then mated back to the particular recessive mutant type, giving rise to the following percentage probabilities in the offspring:—

Example 3.—

	Dark Hybrid Silverblu Carrier	×	Silverblu
Somatic Cells	Pp		pp
Germ Cells	P and p		p

	P	p
p	Pp	pp

50% Dark Hybrid Silverblu Carriers.
50% Silverblu

Such a method of mating mutant type mink is frequently better than crossing mutant type with mutant type because of the greater possibility of producing larger litter size and stronger offspring.

Arctic Snow White Recessive Mink.—There is also a recessive strain of Albino pink-eyed white mink called "Arctic Snow White" as well as other dominant strains of white mink. The Arctic Snow White has almost lost the

ability to produce pigment (melanin) save in the fur at the extremities of the body. Occasionally, there is a smudge of pigmentation around the nose and some colour in the fur of the tail. This type of albinism exists in other species of animals where it is known as Himalayan albinism and designated by the genetical formula "$c^h c^h$".

When such albino mutant mink are mated together they breed true, giving rise to litters of white kits similar to themselves. However, this mutation is recessive to any other type of mink with pigmented fur.

In examples 4, 5 and 6 the albino mink originated in Standard Dark mink. mink.

Example 4.—Cross of Arctic Snow White with Standard Dark Mink Gives the Following Percentage Probabilities Among the Progeny:

	Arctic Snow White	×	Standard Dark
Somatic Cells	$c^h c^h$		CC
Germ Cells	c^h		C

Progeny are 100% dark mink (Cc^h) carriers of albino factor "c^h".

Example 5.—Cross of Dark Mink, Carrier of Albinism, with Dark Mink, Carrier of Albinism, Gives the Following Percentage Probabilities:

	Dark Mink (Carrier)	×	Dark Mink (Carrier)
Somatic Cells	Cc^h		Cc^h
Germ Cells	C and c^h		C and c^h

	C	c^h
C	CC	Cc^h
c^h	Cc^h	$c^h c^h$

25% Standard Dark mink (CC)
50% Standard Dark mink (Carriers of albinism Cc^h).
25% Albino (White) mink ($c^h c^h$)

An interesting consideration in the mating of this albino strain occurs when the albino mink in question have been obtained not directly from Standard mink, but from mutant stock, either of dormant or recessive types.

Occasionally, a rancher purchases Arctic Snow White albino mink but finds when he has mated them to his Standard Dark mink that an unexpected dominant mutant type appears among the progeny. In the litter from this cross they are not all dark mink as shown in example (4).

This unexpectancy results from the fact that the albino white mink used in this mating originated from that same dominant mutant stock. Although as previously stated albinism is recessive to any coloured type of mink, this statement applies only when the gene "c^h" for albinism is single and another colour gene is present to dominate it by supplying pigment (melanin) to the mink to produce its typical coloration. In mutant stock, in which both recessive albino factors come together, they prevent the formation of pigment in the animal's body, and, therefore, no colour pattern of the dominant mutant type can be formed simply from lack of pigment. Accordingly, the recessive white mink carry any mutant type in abeyance and when such a recessive white mink is crossed with a coloured mink which supplies "C" for colour, the dominant gene of the cross can show up among the progeny.

Similarly, in the case of a recessive mutant type, as, for example, Silverblu, if the recessive white stock originated in a stock of Silverblu mink and is crossed with a dark hybrid (Silverblu half-blood) some Silverblu kits can be produced in the litter as soon as the colour factor is re-introduced into the white stock by the dark hybrid animal.

Another important fact for the practical mink rancher to keep in mind, when crossing recessive mutant types with recessive white mink originating from standard dark mink, is the new relationship which will be established in respect to dominance in the kits of such a cross. Although Silverblu is dominant to recessive white albinism, nevertheless, the kits here will not be Silverblu, but dark carriers of Silverblu and albinism.

For such a cross with Silverblu to produce Silverblu kits in this litter, the Arctic Snow White would have to originate in a Silverblu stock, and carry the Silverblu factor or factors in abeyance to the "cc" albino factors, such as might be obtained from a cross of two dark dihybrid carriers of albinism produced from a cross of an Arctic Snow White mink (of Standard Dark origin) with a Silverblu mink, as follows:

Example 6.—

	Silverblu	Arctic Snow White of Standard Dark Origin
Somatic Cells	CCpp	c^hc^hPP
Germ Cells	Cp	c^hP

Progeny—100% dark dihybrid carriers of Silverblu and albinism (Cc^hPp).

The cross of two such dark dihybrid carriers of Albinism and Silverblu traits gives the following percentage probabilities:—

Example 7.—

	Dark dihybrid	×	Dark dihybrid
Somatic Cells	Cc^hPp		Cc^hPp
Germ Cells	CP		CP
	Cp		Cp
	c^hP		c^hP
	c^hp		c^hp

	CP	Cp	c^hP	c^hp
CP	CCPP	CCPp	Cc^hPP	Cc^hPp
Cp	CCPp	CCpp	Cc^hPp	Cc^hpp
c^hP	Cc^hPP	Cc^hPp	c^hc^hPP	c^hc^hPp
c^hp	Cc^hPp	Cc^hpp	c^hc^hPp	c^hc^hpp

The mink of genetic constitution (c^hc^hPp) would be white (albino) but hybrid for the Silverblu trait and the mink (c^hc^hpp) would also be white, but homozygous for the Silverblu trait, which is held in abeyance because of the inability of this animal to produce melanin.

Example 8.—The cross of an Arctic Snow White mink of the genetic constitution (c^hc^hPp) with a Silverblu mink would give the following types of kits:

	Silverblu, Carrier of albino Factor	×	Arctic Snow White, Carrier of Silverblu Factor.
Somatic Cells	Cc^hpp		c^hc^hPp
Germ Cells	Cp and c^hp		c^hP and c^hp

	c^hP	c^hp
Cp	Cc^hPp	Cc^hpp
c^hp	c^hc^hPp	c^hc^hpp

Progeny—50% White albino (c^hc^hPp and c^hc^hpp)
25% Dark dihybrids (Cc^hPp)
25% Silverblu, Carriers of albinism (Cc^hpp)

Hence, from this mating of Silverblu with Arctic Snow White, the three kinds of progeny might be produced in the same litter.

EXAMPLES OF CROSSES WITH DOMINANT MUTANT MINK

A study of the progeny produced by a cross of a dominant mutant type mink, such as Kohinur (dominant white) with Standard Dark mink serves to illustrate the percentage probabilities and kinds of offspring which may be expected from dominant mutant crosses.

Cross of Kohinur with Standard Dark Mink.—Kohinur, a dominant mutation, may be represented in the purebred or homozygous form by KK or in the hybrid form as Kk. The homozygous form KK gives rise to an almost white mink with dark spots at the nape of the neck and root of the tail, while the hybrid form Kk is commonly known as the Black Cross form of Kohinur. Dominance is not complete here, however, or both KK and Kk animals would be identical in appearance.

Example 9.—A cross of the homozygous or purebred form of Kohinur mink with Standard Dark mink gives the following percentage probabilities

	Kohinur	×	Standard Dark Mink
Somatic Cells	KK		kk
Germ Cells	K		k

100% of the progeny have the hybrid Kk genetical constitution with respect to this factor and are Kohinur, Black Cross type mink.

Example 10.—A Cross of Kohinur, Black Cross Mink (heterozygous type) with Standard Dark Mink gives the following percentage probabilities:

	Kohinur, Black Cross	×	Standard Dark Mink
Somatic Cells	Kk		kk
Germ Cells	K and k		k

	K	k
k	Kk	kk

50% Kohinur, Black Cross (Kk)
50% Standard Dark Mink (kk)

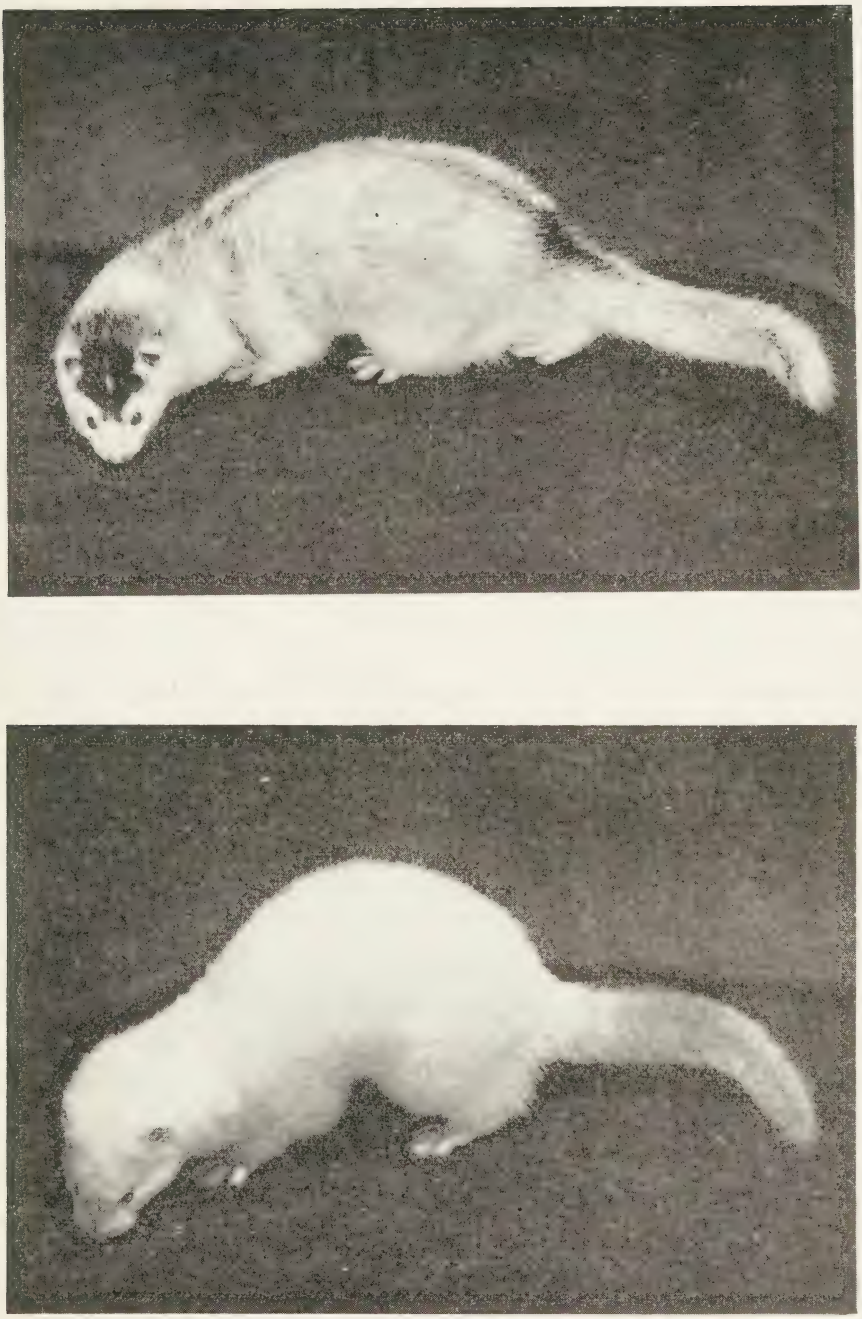


Fig. 5—Kohinur, Black Cross mutant mink (above); Arctic Snow White mutant mink (below).

Example 11.—A Cross of Kohinur, Black Cross, with Kohinur, Black Cross, gives the following percentage probabilities:

	Kohinur, Black Cross	×	Kohinur, Black Cross
Somatic Cells	Kk		Kk
Germ Cells	K and k		K and k

	K	k
K	KK	Kk
k	Kk	kk

25% Kohinur (homozygous)
50% Kohinur (heterozygous, Black Cross)
25% Standard Dark Mink

The above series of formulae apply equally to other dominant mutations crossed with Standard Dark mink, except in certain mutant forms such as Blufrost, in which like the Standard Platinum fox, the homozygous form is lethal. Accordingly, in such a cross of Blufrost with Blufrost mink, there is a reduction of 25 per cent in litter size as a result of the homozygous type dying *in utero*. Therefore, all Blufrost mink are hybrid forms with the genetic formula of Ss. The SS or homozygous (purebred) form has not been found viable or in existence to date.

Similarly, dominant—recessive blends of mink, incorporating Blufrost in their make-up such as, for example, Breath-of-Spring, when mated together also give rise to litters of reduced size as a result of the dominant Blufrost genes being lethal when they come together in any cross in which they are involved.

PRODUCTION OF DOMINANT WHITE MINK

When a rancher wishes to produce dominant white mink, a knowledge of the results of crossing dominant mutations together and the kinds of progeny he may get from the different matings is important. Different degrees of whiteness are produced by crossing together Kohinur with Kohinur and Kohinur with Blufrost, as well as the dihybrids from such crosses.

Example 12.—A Cross of Kohinur with Blufrost gives the following percentage probabilities

	Kohinur	×	Blufrost
Somatic Cells	KKss		kkSs
Germ Cells	Ks		kS and ks

	kS	ks
Ks	KkSs	Kkss

50% White (95%) (Noble-Taylor Blufrost blend)
50% Kohinur, Black Cross.

Example 13.—A Cross of the White (95%) with Kohinur gives the following percentage probabilities:

	White (95%)	×	Kohinur
Somatic Cells	KkSs		KKss
Germ Cells	KS Ks kS ks		KS

	KS	Ks	kS	ks
Ks	KKSs	KKss	KkSs	Kkss

25% White (99%) This form usually has very few black hairs. Called "Snow White"
25% Kohinur
25% White (95%)
25% Kohinur, Black Cross.

Example 14.—A Cross of White (99%) with White (99%) gives the following Percentage Probabilities.

	White (99%)	×	White (99%)
Somatic Cells	KKSs		KKSs
Germ Cells	KS and Ks		KS and Ks

	KS	Ks
KS	KKSS	KKSs
Ks	KKSs	KKss

66% White (of 99% type)
33% Kohinur.
(Note.—The homozygous form of Blufrost (KKSS) dies *in utero*).

Example 15.—A Cross of White (95%) with White (99%) gives the following Percentage Probabilities.

	White (95%)	×	White (99%)
Somatic Cells	KkSs		KKSs
Germ Cells	KS Ks kS ks		KS Ks

	KS	Ks	kS	ks
KS	KKSS	KKSs	KkSS	KkSs
Ks	KKSs	KKss	KkSs	Kkss

33·33% White (99%)
33·33% White (95%) } 83·33% dominantly White Mink.
16·67% Kohinur
16·67% Kohinur, Black Cross

(Note.—The homozygous forms KKSS and KkSS again die *in utero* giving rise to 25% reduction in litter size).

DOMINANT—RECESSIVE BLEND

Another important method for mating mink is known as a "back cross". It is important to the mink rancher who wishes to blend a dominant with a recessive mutant type mink, and it is often referred to as a "dominant-recessive blend". For example, it is used in the production of Breath-of-Spring mink, Arctic Blues, etc., of which the mating for the former is shown below.

There are two steps in such a blending operation. The first consists of the mating of dominant and recessive mutant types together; the second in the mating of the dihybrid progeny from the first cross, back to the double recessive parent.

In the production of the Breath-of-Spring mink, the dominant mutant is the Blufrost mated with a recessive mutant type, similar to Silverblu as in the following examples:—

Example 16.—A Cross of Blufrost with Silverblu gives the following Percentage Probabilities

	Blufrost	×	Silverblu
Somatic Cells	SsPP		sspp
Germ Cells	SP sP		sp

	SP	sP
sp	SsPp	ssPp

50% Blufrost (dihybrids or SsPp)
50% Standard Dark (Silverblu Carriers or ssPp)

The Breath-of-Spring is produced by mating the dihybrid of the two mutant types back to the Silverblu or double recessive type. The following percentage probabilities result among the progeny:—

Example 17.—A Cross of Silverblu with Blufrost (Carrier of Silverblu) gives the following Percentage Probabilities:

	Blufrost	×	Silverblu
Somatic Cells	SsPp		sspp
Germ Cells	SP Sp sP sp		sp

	SP	Sp	sP	sp
sp	SsPp	Sspp	ssPp	sspp

25% Blufrost (Carriers of Silverblu)
25% Breath-of-Spring (Sspp)
25% Standard Dark (Carriers of Silverblu)
25% Silverblu.

Wherever dominant and recessive mutant types are blended together in a so-called dominant-recessive blend, the manner of genetical reasoning and the two steps in mating required are as shown to produce the new type blended mink, Breath-of-Spring (Sspp).

DOUBLE RECESSIVE BLENDS

Other new types of mink, such as the "Sapphire" and "Eric", are produced in another manner, by a double recessive blend. Here, two different recessive mutant types are mated together in the first cross, the progeny from which are all dark mink but carriers of both recessive mutant factors or dihybrids. In the second cross these dihybrids are mated together and, in one chance out of sixteen, both pairs of the recessive genes of the two parents will allocate in the same kit, giving it the new characteristics of a resultant blending effect of both recessive mutations in the same animal. Examples 18 and 19 show the two steps in crossing two recessive types together in order to derive the type with the double recessive blend of fur colour.

Example 18.—A Cross of Imperial Platinum with Aleutian Blue Recessive Mutant Mink gives the following Percentage Probabilities:

	Imperial Platimun	×	Aleutian Blue
Somatic Cells.....	ipipWW		IPIPww
Germ Cells.....	ipW		IPw

	IPw
ipW	IPipWw

Progeny are 100% dark kits, dihybrid carriers of both recessive mutant type genes.

Example 19.—A Cross of Dark Dihybrid Kits, Progeny of the Above Cross, results as follows:

	Dark Dihybrid (Carrier of Aleutian and Imperial Platinum.)	×	Dark Dihybrid (Carrier of Aleutian and Imperial Platinum).
Somatic Cells.....	IPipWw		IPipWw
Germ Cells.....	IPW IPw ipW ipw		IPW IPw ipW ipw

	IPW	IPw	ipW	ipw
IPW	IPIPWW	IPIPWw	IPipWW	IPipWw
IPw	IPIPWw	IPIPww	IPipWw	IPipww
ipW	IPipWW	IPipWw	ipipWW	ipipWw
ipw	IPipWw	IPipww	ipipWw	ipipww

The new type of "Sapphire" mink has the genetic constitution "ipipww" as shown in the lower right hand corner of the above chart. It has fur of a bright soft blue colour which is the resultant blend of the two recessive mutations superimposed on each other in the same mink.

Considerable discussion and advertising of the other mink from such a dihybrid cross has taken place. They have been given the name "Improved Aleutians" and are considered automatically to be carriers of the Platinum factor. However, examination of the genetic constitutions in the chart shows that some mink from this cross are not dihybrids. The improvement, when it occurs from such a cross, might result from other hereditary factors in the strains of mink and not necessarily from the mutant genes. It is known that mink with genetic constitutions, as listed in the chart can be present in litters from dihybrid crosses. Only by very extensive breeding work however, could the presence be proved of some of the genetic types listed. Some genetic types here are valuable in the production of Sapphire mink kits in the next generation. In this sense they are improved in value as breeding stock in the production of Sapphire mink.

Another new type of mink which is the blended product of Aleutian Blue and Royal Pastel mink was obtained in a manner similar to the above example and is called an "Eric" mink. Obviously, many new types of recessive blended mink can be produced from pairs of recessive mutant mink in a manner analogous to "Sapphire" and "Eric" mink. Other new triple recessive blends may also be obtained in this manner from the incorporation of three recessive mutant types in the same mink. They might be produced as follows:—

First Cross, Sapphire Mink × Royal Pastel to obtain Trihybrid Progeny:

	Sapphire	×	Royal Pastel
Somatic Cells	ipipwwRR		IPIPWWrr
Germ Cells	ipwR		IPWr

Trihybrids (all first generation) IPipWwRr

Second Cross of Trihybrids to obtain new triple blend of Sapphire and Royal Pastel mink.

	Trihybrid	×	Trihybrid
Somatic Cells	IPipWwRr		IPipWwRr
Germ Cells	IPWR		IPWR
	IPWr		IPWr
	IPwR		IPwR
	IPwr		IPwr
	ipWR		ipWR
	ipWr		ipWr
	ipwR		ipwR
	ipwr		ipwr

	IPWR	IPWr	IPwR	IPwr	ipWR	ipWr	ipwR	ipwr
IPWR	IPIPWWRR	IPIPWWRr	IPIPWwRR	IPIPWwRr	IPipWWRR	IPipWWRr	IPipWwRR	IPipWwRr
IPWr	IPIPWWRr	IPIPWWrr	IPIPWwRr	IPIPWwrr	IPipWWRr	IPipWWrr	IPipWwRr	IPipWwrr
IPwR	IPIPWwRR	IPIPWwRr	IPIPwwRR	IPIPwwRr	IPipWwRR	IPipWwRr	IPipwwRR	IPipwwRr
IPwr	IPIPWwRr	IPIPWwrr	IPIPwwRr	IPIPwwrr	IPipWwRr	IPipWwrr	IPipwwRr	IPipwwrr
ipWR	ipIPWWRR	ipIPWWRr	ipIPWwRR	ipIPWwRr	ipipWWRR	ipipWWRr	ipipWwRR	ipipWwRr
ipWr	ipIPWWRr	ipIPWWrr	ipIPWwRr	ipIPWwrr	ipipWWRr	ipipWWrr	ipipWwRr	ipipWwrr
ipwR	ipIPWwRR	ipIPWwRr	ipIPwwRR	ipIPwwRr	ipipWwRR	ipipWwRr	ipipwwRR	ipipwwRr
ipwr	ipIPWwRr	ipIPWwrr	ipIPwwRr	ipIPwwrr	ipipWwRr	ipipWwrr	ipipwwRr	ipipwwrr

The genetic constitution of the new trihybrid blend of Sapphire and Royal Pastel is "ipipwwrr" and has a probability of occurring once in sixty-four times in the trihybrid cross. If it is beautiful, its rarity should make it very valuable.

Double recessive mutant type mink as "Sapphire" and "Eric" breed true among themselves and if crossed back to either of their parential stock will produce 100 per cent of kits of the particular parental type to which the mating has been made.

From a study of the genetics of mutant type mink it may be seen that new colour types in mink have resulted from:—

1. True mutations of dominant and recessive types, (*see* "Mink Mutations") e.g. Blufrost, Silverblu and Arctic White, etc.

2. Combinations (back crosses) of dominant and recessive mutations (dominant—recessive blends) e.g. "Breath-of-Spring" from Blufrost and Silverblu.

3. Blending or superimposing of two recessive mutant types of mink in the same animals (double recessive blends) e.g. "Sapphire" and "Eric". Other new types of triple and quadruple etc., recessive blends can accordingly be produced by this method of incorporating several recessive mutations into the same mink.

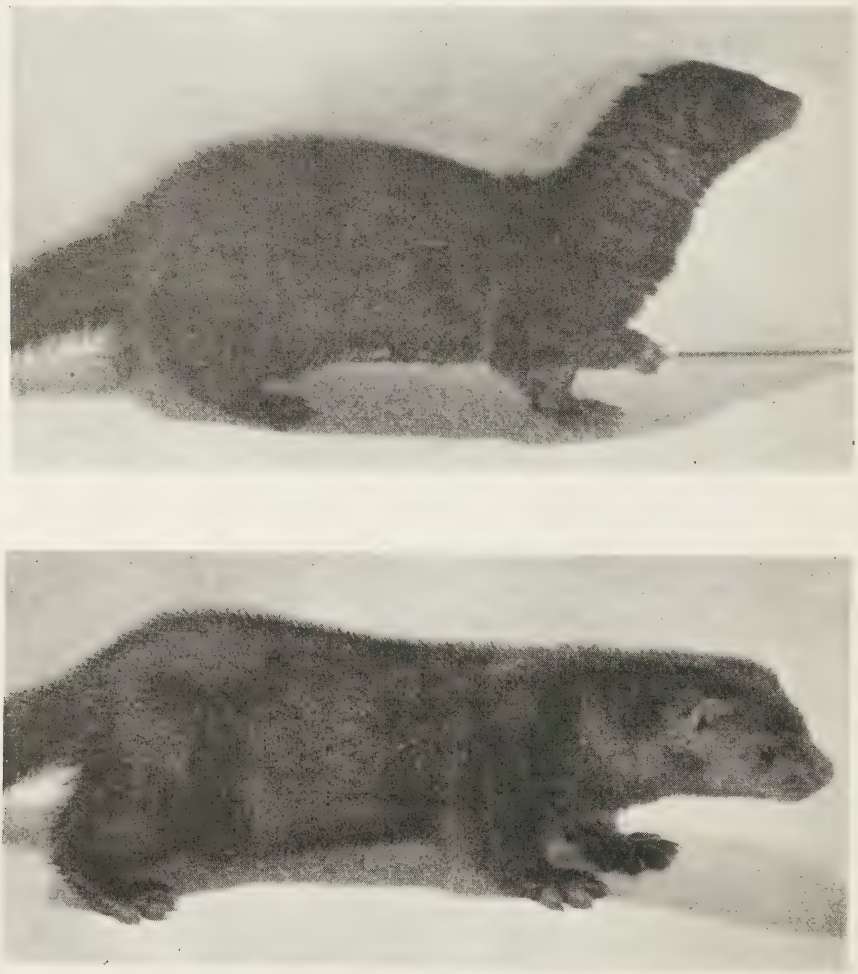


Fig. 6.—Aleutian Blu mutant mink (above); Blufrost mutant mink (below).

4. Crossing of dominant types together, e.g. Kohinur and Blufrost to obtain dominant whites.

5. Crossing of some dominant mutations (where dominance is not complete) with Standard Dark mink to obtain dominant (hybrid) forms of a different colour pattern to the homozygous form; e.g., homozygous Kohinur crossed with Standard Dark mink to obtain Kohinur (hybrids) of the Black Cross type.

With a knowledge of the foregoing types of crosses, the mink ranchers can calculate almost any possible combination of crosses, and the percentage probabilities of kinds of progeny in the litters when adequate numbers of the specific types of matings have been made to give significant proportions among the progeny.

The names of some of the more common types of blended mink and other varieties produced from the known mutant forms are listed below:

DOMINANT—RECESSIVE BLENDS

Name	Genetic Formula	Matings Similar in Genetic Type	Synonyms
Breath-of-Spring	Sspp	16 and 17	(Blufrost-Silverblu blend), also called Silvered Silverblu, Silver Sable Silverblu, Frosted Silverblu, Silver Blufrost.
Breath-of-Spring (Royal Pastel)	Ssrr	16 and 17	(Blufrost-Royal Pastel Blend).
Breath-of-Spring (Imperial Platinum)	Ssipip	16 and 17	(Blufrost-Imperial Platinum blend) also called Platinum Blu, Breath-of-Spring, Marsh Platinum, Breath-of-Spring Platinum.
Breath-of-Spring (Aleutian Blue)	Ssww	16 and 17	(Blufrost-Aleutian blend) also called Breath-of-Spring Waris Blue, Arctic Blue.
Blucross	KkPp	(Analogous to any dihybrid, e.g. 12.)	(Kohinur (hybrid) Silverblu blend) also called Silverblu Cross, Glacierblu Blucross, Platinum and Pearl.
Royal Pastel (Kohinur)	Kkrr	17	(Kohinur (hybrid) Royal Pastel blend). Pastel Cross.
Noble-Taylor (Blufrost blend) (95%)	KkSs	12 and 13	(Dihybrid of Kohinur and Blufrost), also called dominant White, near White and 95% White.
Snow White (95%)	KKSs	13	(Kohinur (homozygous) Blufrost Blend) also called Black-eyed dominant white, Pure White, Royal White and 99% White.

DOUBLE RECESSIVE BLENDS

Sapphire	ipipww	18 and 19	(Imperial Platinum Aleutian Blend) also called Blue Sapphire.
Eric	rrww	18 and 19	(Royal Pastel Aleutian blend).

STEWART FACTOR

While the blue colour in mink fur is a desirable attribute, the reddish brown colour is undesirable and is usually the sign of an off-coloured pelt. This is particularly so in Silverblu and Aleutian type mutant mink. Recently a new genetic factor—called the "Stewart Factor"—has been found which markedly eliminates or prevents the occurrence of an off-coloured condition in mink.

This factor acts by diluting the original coat pigmentation to give it (underfur and guard fur) paler and clearer colour tones.

It has been suggested that this "Stewart Factor" is inherited as a simple dominant factor; however, breeding evidence is not complete in this respect at the writing of this material. If such is the case, however, the "Stewart Factor" can be introduced into a strain of mink by the same procedure as other mutations; for example, as the Kohinur mutation can be introduced into a Standard Dark breed of mink. The first cross will give only hybrids for the factor (using a homozygous Stewart mink). Crossing of these hybrids together the second year will give on the average 25 per cent Stewart (homozygous), 50 per cent Stewart (heterozygous), and 25 per cent non-Stewart or Standard mink similar to the original herd strain before the factor was introduced into the ranch.

FEEDING OF MINK

The feeding of mink is a much debated subject. Many successful mink ranchers feed their animals rations which differ both in the nature of the ingredients and in the proportions of these used in the diet. This difference results chiefly from the more ready availability of particular feedstuffs in certain localities.

However, since the mink is a carnivorous animal, its main feed ingredient is meat or fish. To this is added a small proportion of cereals, vegetables, minerals and accessory food factors. The proportions of the above ingredients are usually changed according to the seasonal requirements of the mink under their semi-domesticated life in a mink ranch.

A good general ration, for strains of mink accustomed to a meat diet, is as follows:—

Mink Rations

DECEMBER TO AUGUST

	Percentage	
Meats:		
Liver	10	
Horse meat	56	or (40% meat, 20% fish)
Tripe, offal meat or brains	6	
Cereals and Accessory Factors:		
Commercial mink meal	15	
Brewer's yeast, (dried)	2	
Linseed meal	1	
Wheat germ	2	
Wheat bran	1½	10%
Bonemeal	2	
Charcoal	¼	
Fishmeal	½	
Iodized salt	¼	
Cod liver oil	½	
Other Ingredients:		
Egg (1 egg to 10 mink, fresh or hard boiled)	—	
Milk—to mix feed	—	
Tomatoes, root vegetables, greens	3	

Cobalt (1 ounce dissolved in 1 gal. water) 10 drops of this solution per mink daily, or 1 ounce of solution to 60 mink.

SEPTEMBER TO NOVEMBER

Meats:	Percentage
Liver	10
Horse meat	25
Tripe	25
Offal meat and brains	5
Cereal and Accessory Factors:	
Commercial mink meal	20
Brewers' dried yeast	3
Linseed meal	$2\frac{1}{2}$
Wheat bran	3
Charcoal	$\frac{1}{4}$
Iodized salt	$\frac{1}{4}$
	9%
Other Ingredients:	
Eggs (1 egg to 5 mink)	—
Mix feed with water	—
Tomatoes, roots, greens	6

Cobalt, (1 oz. dissolved in 1 gal. water) give 10 drops per mink or 1 oz. of solution to 60 mink.

NOTE.—Where the commercial mink meal contains adequate quantities of the accessory factors and trace elements, it is not necessary to add them to the ration, but the total amount of mink meal should be increased accordingly in the ration.

Feed 4-6 ounces dry weight according to the size and appetite of the mink. The amount of feed may be increased to 7-8 ounces during the fall months and in accordance with the requirements of females with young during June, July and August.

The mink should be maintained in good flesh without allowing them to become too fat. (See "Conditioning of Mink"). It is often found that "runners" result from underfeeding and are cured by adequate feed.

The meat portion of a mink ration may comprise horse meat, beef, beef heart, beef trimmings, rabbits, tripe, birds or fish.

Where fish is readily available to the mink rancher, it may be used to supplement the mink ration, especially in the summer season (ocean white fish and non-oily varieties are preferable).

Fresh water herring and ocean herring are used quite extensively for feeding mink, but they are not particularly good species of fish to feed. Considerable care should be taken in the feeding of fresh water species of fish in which the offal, fins and scales are known to cause a vitamin B_1 deficiency or chastek paralysis in mink. This is especially so where frozen fish are used that have been in storage for several months. When fresh water fish are used in a mink ration, they may be fed three or four times weekly with meat fed on the other days. Brewers' yeast should be included in the ration to maintain a constant and adequate supply of vitamin B_1 when fish is used in the ration.

During the winter months prior to the breeding season, it is advisable to feed a high percentage of red meats, while in the furring season this can be replaced by tripe. During the autumn months (September-November) reduction of red meats will help to hold the fur colour. Since the young mink have reached adult size by September, reduction in red meats does not affect their growth at that time of the year.

During the furring season, the cereal portion of the ration is also increased to fatten the mink and stimulate growth of dense underfur. Water replaces the milk for mixing the diet at this season to reduce the fat in the diet and thereby assist in holding colour. Cod liver oil and bonemeal are also unnecessary, being harmful, if anything, in the furring ration and, accordingly, are omitted from the diet during the fall season.

Charcoal, bran and linseed meal are added, chiefly to assist in maintaining good intestinal action.

Adequate vitamins A, B, C, D and E are obtained in the diet through such ingredients as cod liver oil, wheat germ, yeast, tomatoes and liver. These are exceedingly important in a mink diet to prevent nutritional disturbances resulting from deficiencies of these accessory feed factors.

Liver is an essential ingredient in the mink ration to prevent anaemia which occurs in these animals if this ingredient is omitted from their ration for several months. Cobalt also assists in the prevention of anaemia.

SUPPLEMENTARY KIT RATIONS

During the early weeks of the growing season (i.e., when the kits are three to nine weeks of age), some ranchers think it advisable to increase the moisture content of the regular feed and also to supplement the regular ration with a morning meal for the kits. A convenient plan is to use deep pie plates or regular crockery animal feeders which can be placed on the floor of the pen for the supplementary kit ration. If pie plates are used, they can be prevented from upsetting by placing wooden frames around them.

If the rancher has time, he may give the kits a morning meal of whole cows' milk in which shredded wheat or stale bread has been thoroughly soaked, to supplement the milk taken from the female mink. The necessity for this depends on the milking condition of the female mink. Small pieces of liver and an occasional egg and some mink meal may be added to this supplementary meal for the kits. Such extra feed for the kits, when they begin to go out in the pen, greatly increases their growth and helps to relieve the milking strain on female mink with large litters.

Watering pans should be attached low enough on the wall of the mink pen to permit the young to drink water as soon as they can get out of the nest box and get around the pen floor by themselves. (See Figure 9).

PRIMENESS OF FUR AND PELTING OF MINK

Primeness of the Fur

Pelting of the mink should be done when the pelt has reached the prime state. Too many mink ranchers fail to follow this rule and take off the pelt while the leather is still blue in colour or unprime. Usually mink pelts have reached the prime state about the end of November of each year, but this is not an infallible rule. Cold weather, the quantity and kind of feed, as well as the strain of mink, are factors which cause variation in the time mink become prime.

It is a good plan to begin examination of the adult and kit mink about October 15 and mark them early, medium and late according to how far the furring-up process has advanced at that time. This makes it easier to decide which are prime or still unprime during the pelting season. On November 10 and 15 go back over those marked early. Later, go over the medium group and finally the group designated as late. Animals here and there in the mink ranch should be selected and the fur blown open to note whether or not the underlying skin is a creamy white colour as found in the prime pelt. It is important to examine the leather for primeness, because the fur to the beginner in mink ranching may appear to be glossy and richly coloured before the priming process has been completed, that is, before the fur hairs have reached their mature state, when all the pigment has passed into the hair shaft from the root embedded in the skin, which will have taken place by the time the pelt has reached the prime state. It is this residual pigment (melanin within the roots of the immature fur hairs which gives rise to the blue colour of an unprime pelt. Figure 7 depicts a cross section of skin showing fur hairs at different

phases (1-4) of their life cycle. Cuts 1-3 in Figure 7 show the distribution of pigment during the unprime state, while cut 4 shows a prime portion of skin in which the hair root is devoid of pigment. Such unprime pelts are usually lacking in density of underfur and after the pelt is dried the fur appears flat when compared with a fully prime pelt. If there is any doubt, it is advisable to let the pelts go a little over prime rather than to take them off too soon. However, if the pelt is allowed to go too far past the peak of its prime state, the fur begins to go off colour which is also detrimental to the value of the pelt.

A study of the growth of fur hairs shows that the unprime pelt has thicker leather which also detracts from its value because lightness of leather is desirable. Observation of the leather side of an unprime pelt frequently shows the pigmented fur hair roots, whereas if such a pelt is allowed to mature or prime, then the fur hairs reach their full density and length by pushing their way out of the skin with the result that the leather can be scraped deeper without

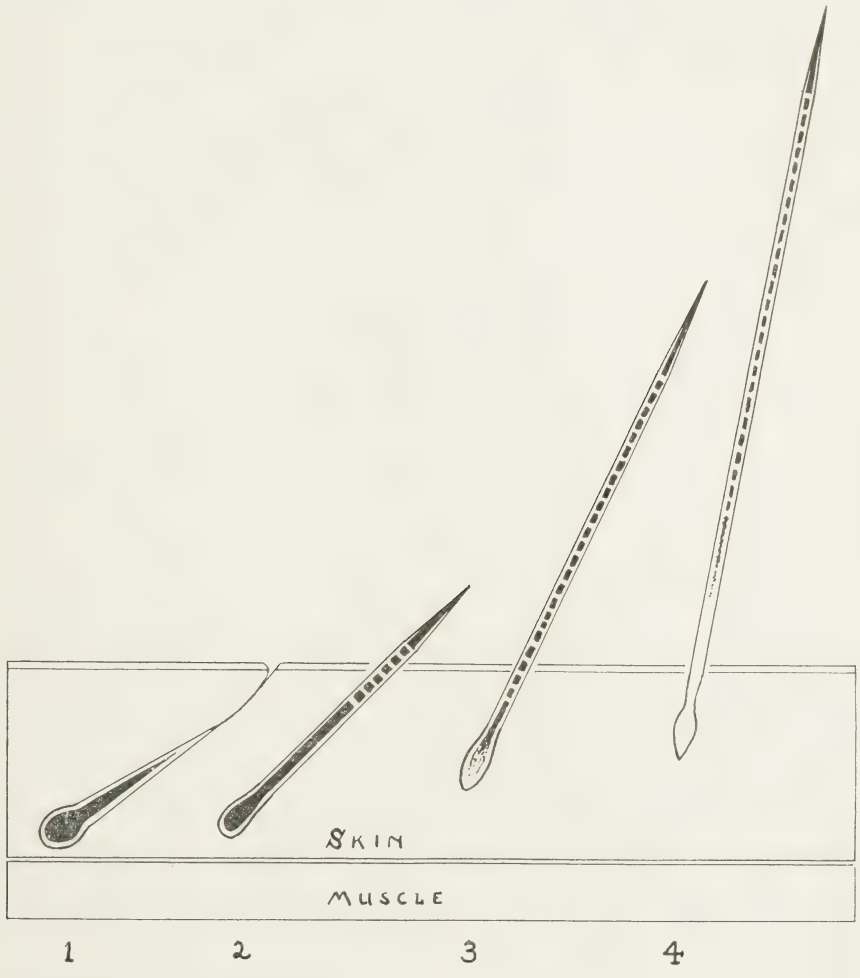


Fig. 7—Diagramatic cross section of pelt, showing hairs and their relative depth in skin during four stages of their life cycle. 1-3 show unprime state with pigment in roots of hairs, while 4 shows prime state with unpigmented roots in mature erect hair.

cutting the hair roots and the resultant leather is thinner. Thin leather, but of sufficient strength for manufacturing of mink garments, is preferable to pelts with heavy or thick leather, which makes garments unduly heavy.

The following indications as to the stage of growth of the fur should therefore be studied in determining the prime state in mink:—

1. The leather should appear creamy white in colour. This is especially important in the region of the shoulders and nape of the neck, which are the last areas to become prime in the pelt. The priming process in standard mink pelts in Canada varies between the first week in November to the middle of December, and even later for some mutant types.

2. The fur should appear glossy and dense over the coat of the animal and there should be no further evidence of shedding old fur, or of dandruff among the fur.

3. It is advisable that the rancher pelt an animal here and there among the kits and adults throughout the ranch, to determine by random sample the relative state of primeness of the mink in the ranch before proceeding with the general pelting of the stock.

Methods of Killing Mink

Several methods are available to the mink rancher by which he may kill his mink is a relatively humane manner. Of these, possibly the injection method or gas suffocation method are used most extensively. A killing clamp is still used, however, by many ranchers.

A brief outline of the equipment and procedure of these methods for killing mink follows:—

INJECTION METHOD

This method is convenient, economical, and causes instant death, leaving the carcass of the mink in a relaxed state, convenient for immediate pelting operations. An attendant holds the mink while five cubic centimetres of a saturated solution of Epsom Salts (magnesium sulphate) is injected into the heart of the mink by means of a 10-cubic centimetre capacity hypodermic syringe and No. 18 gauge needle.

GAS SUFFOCATION METHOD

Cyanide gas or carbon monoxide gas are most commonly used in a special lethal chamber or fumigation box. A box with a glass window on the top is constructed of a convenient size to hold a number of wire-bottomed, individual catching boxes, in which the mink are placed to be killed. These are placed side by side on a wire screen or slatted false bottom in the chamber of the box. Where cyanide gas is used, the box should be reasonably gas-tight. About four inches beneath the false bottom of the lethal chamber, a sliding tray is used upon which to place the cyanide gas in powder or crystalline form. The tray is pulled out and the cyanide powder, calcium cyanide ($\frac{1}{2}$ teaspoonful per mink to be killed is sufficient) is spread on the tray. The tray is then pushed back into the box and the animals are asphyxiated in a few minutes. However, they should be allowed to remain in the box 20-30 minutes to ensure that all the animals will be dead and that none will revive when they are taken out of the chamber to be pelted.

When carbon monoxide gas is used, a hose 15 feet long is attached to the exhaust pipe of an automobile and the other end of the hose inserted into the fumigation box. Over the outlet, a splash board should be inserted to prevent any moisture or carbon from actually hitting or coming into contact with the mink in

the lethal chamber. Near the top of the chamber two small holes should be drilled to prevent an accumulation of pressure when carbon monoxide gas from an automobile exhaust is used. Here, the mink are placed in the fumigation box as before, but a double layer of cheesecloth is laid over the top of the catching boxes, below the entry of the gas, to prevent carbon and moisture from reaching the mink pelts which otherwise might cause harming of the fur during the process of killing or gassing.

SAFETY PRECAUTIONS

Carbon monoxide and cyanide gases are very poisonous to man. Therefore, certain precautions should be followed if they are used as agents to kill mink.

1. The fumigation boxes should be kept outdoors during killing operations.

2. Mink killed by cyanide gas should be shaken well in the outdoor air and then allowed to cool outdoors for one hour before they are skinned.

3. Calcium cyanide (any commercial form) is commonly used for killing mink. It should not be allowed to come into contact with clothes or bare hands.

4. Since pure carbon monoxide gas is colourless and odourless, therefore, the ordinary senses are poor precautionary signals to rely upon. The rancher should not unduly expose himself to this gas as it escapes out of the fumigation box.

Skinning, Scraping and Drying of Pelts

Skinning of mink is more easily carried out when the animal has just been killed and the carcass is still warm. Animals which have been allowed to freeze after they have been killed are difficult to pelt. Therefore, it is advisable to kill only a convenient number of mink at one time. The actual skinning operation may be conveniently carried out as follows:—

The carcass of the mink is placed on a table and, with a skinning knife (a sharp jack knife serves the purpose) slit the skin on both rear legs from the back of the paw pad to the opposite rear foot pad, stretch the rear legs sideways, then slit from one to the other below the vent. The knife will be required to loosen the skin from the feet to the hock joints. Otherwise use the fingers to separate the skin from the flesh. The skin is thus separated from the toe bones down to the last or terminal joint. Here, the bones are snipped off with wire clippers or bone cutters, leaving the last toe joint and claw as part of the pelt.

After freeing one leg, attach a strong cord to it and hang the animal, head down, from a high cross beam or hook, to complete the pelting operation.

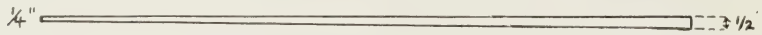
As soon as the skin is free from the hind legs, loosen the skin on the back of the mink against the tail. Starting at the root of the tail, slit the skin on the tail to the tip on the underside. Skin out the tail bone for a short distance at the base of the tail to provide a firm grip to pull out the remainder of the tail bone. If you cannot do this by manual manipulation, insert the tail bone in a board with a narrow notch in it. The latter is firmly nailed to the work bench. Then with a quick jerk pull out the tail bone.

The pelt is now worked downward in the direction of the head by manipulating the thumbs between the skin and the flesh, leaving as much fat as possible on the carcass. The knife should be used very sparingly here until the eyes, ears and mouth are reached.

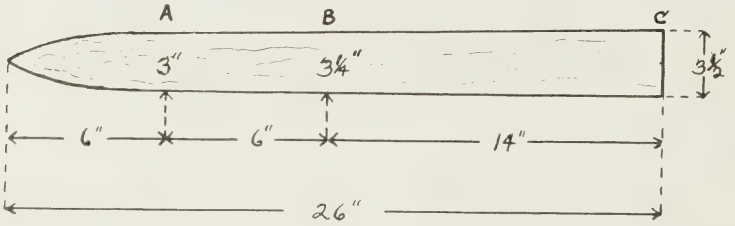
Upon reaching the front legs, they are pulled out and the toes clipped off, as suggested for those on the hind feet, leaving the terminal toe bones and claws as part of the pelt.

The head is probably the most difficult portion of the carcass to skin properly. Care should be taken to leave the ears, eyelids, lips and point of the nose as part of the pelt. If the prominent blood vessels in the neck region happen to be cut, remove any blood stains immediately with a clean cloth moistened with cold water. Care should also be taken to remove excess grease with clean cheesecloth or toilet paper. Do not use sawdust or cleaner agents to remove dirt or grease during the pelting or scraping.

Slip Stick



Drying Board



Dimensions of Drying Board

	Base (C)	Shoulder (A)
Large	3½ inches	3¼ inches
Medium	3 inches	2½ inches
Small	2½ inches	2 inches

Position of Tacks in Pelt on Drying Board

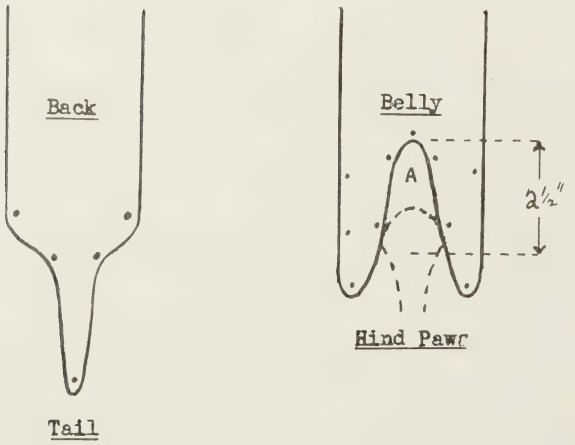


Fig.8—Diagrams showing the shape and dimensions of slip stick, drying board and position of tacks in pelts on drying board. With reference to A (lower right drawing), this shows area of skin cut out at pelting time to assist grader inspecting the pelt—2½ inches above root of tail.

The pelt, flesh side out, should then be carefully pulled on to a fleshing beam or drying board of the proper size for the particular pelt. The fleshing beam is preferable. The tail, and the head likewise, are placed directly in the centre of the board or beam, then the pelt is pulled down firmly, and the feet tacked to the board or beam. It is very important not to stretch the pelt beyond natural size, otherwise, a well furred pelt is stretched into what appears to be a thinly furred skin. Such skins will be of a lower quality and consequently of less value. At this juncture, it is advisable to see that the tail is split right down to its tip and scraped clean, using a very sharp knife on its flat. Then a "V" shaped piece is cut out (see Figure 8) to facilitate inspection of the fur by graders and buyers. It is, then, spread out on the board and tacked at the end. It is important to scrape the tail well, otherwise putrefaction may set in later, causing a condition known in the trade as "tainted tail" for which the value of the pelt is sharply discounted.

Before scraping and drying the pelts, many ranchers leave them in a cool place overnight to allow time for the fat to congeal, in which state it can be more readily removed from the skin. Some experienced mink ranchers, however, prefer to remove the fat within an hour or so after the mink are killed. The beginner is advised to slip a little cloth bag over the tail and tie at the root of the tail. This helps to keep grease off the tail during the scraping operation.

Some ranchers use the same board for scraping the pelt and later drying of the skin. However, it is difficult to obtain a uniform thickness of the leather in the scraping process over the corners of the board, even when these have been carefully rounded. The best instrument for this purpose is a fleshing beam (Plate II, Figure 8). It can be made from a piece of hardwood, 36 inches long, and shaped in the form of a long narrow cone, so that it can be used alike for the smaller and larger pelts. This beam is turned out on a lathe and then made perfectly smooth so that it will not cause uneven areas in the skin after it has been scraped. One end of the pelting beam fits into a two-inch pipe and is held there, firmly, by a nail which passes through the pipe and the inserted end of the wooden beam. (The beginner is advised to purchase a properly proportioned beam from a mink supply store.)

This pipe can be arranged in any position desired by the operator, usually in a vertical position so that the head end of the pelt is directed downward. The tail in the bag is held out of the way by means of an elastic band around the beam. In this manner, the scraping of the pelt is directed toward the head of the pelt and not against the grain of the hair roots in the skin. That is, scraping is begun with the hind legs and every particle of fat is removed pushing it toward the head into a conveniently placed pan attached to the stand of the fleshing beam.

It is important, especially if the pelt is slightly unprime, not to scrape too close, or the fur hair roots will be severed in the process. Once cut, they lose their main anchorage in the leather, and, during the operations in tanning, cleaning and manufacturing of the skin, these fur hairs readily pull out of the pelt. (See Figure 7.)

Therefore, it is safer to underscrape than overscrape. For this operation, always use a dull instrument which further reduces the chance of cutting the fur roots and gouging the skin of the pelt. For this purpose special fleshing knives are manufactured, but a very dull knife of suitable size or a tablespoon may be conveniently used for removal of the gross fat and tissue from the pelt. However, all fatty tissue and adherent muscle tissue must be removed from the flesh side of the pelt in this operation, without allowing an appreciable amount of fat to get on the fur.

DRYING BOARDS

When the fleshing operation has been completed, the pelt should be immediately transferred to a drying board of proper size. Drying boards, as their name implies, are not stretching boards. They can be made from half-inch softwood boards, 26 inches long. Each drying board tapers from the base to the head end which is rounded to fit into the head and nose of the pelt. Usually, three sizes of boards are made to fit the different-sized pelts—large, medium and small. The large board is about three and a half inches wide at the base, gradually tapering to the part that accommodates the shoulders. Figure 8 shows the dimensions and shape of a typical mink pelting board; also the points at which the pelt should be tacked on the board. When the pelt has been removed from the fleshing beam and placed on the pelting board, flesh side out, precautions should be taken to get the tail in the centre and the head and shoulders placed squarely on the board. This is necessary in order to keep the dark stripe running down the middle of the fur in a straight line. Then the skin is gently stroked two or three times from the head down to the tail to smooth out any wrinkles in the skin and make it fit snugly to the board, taking care not to stretch beyond the natural size of the pelt.

If the skin side of the pelt is carefully rubbed with a pad of toilet paper or facial tissue, it gives a glossy, smooth appearance to the skin of the finished article, which is evident to the fur grader who examines all the mink pelts in their cased form with the skin or flesh side out. Cleanness of pelts, resulting from neat workmanship, enhances their valuation in the buyers' estimation.

Tack the pelt on the board on each side, as shown in Figure 8, just above the root of the tail. This latter procedure is omitted by some ranchers. Extend the tail and tack at the tip. The edges of the skin of the hind legs are then tacked on the belly side of the drying board, as shown in the illustration, without further stretching. This leaves a slight pocket just above the tail which enables a grader to examine the skin without difficulty.

Some ranchers slit the fur on the front legs in the pelting operation and, at this juncture, insert small pieces of wood to prevent the skin in this region from shrinking up in the drying process.

For convenience in removing the dry pelt from the drying board, a small strip of wood, called a "Slip Stick", is inserted between the green pelt (belly side) and the lower surface of the board. These sticks are a quarter-inch thick, half an inch wide, and of the same length as the drying boards. The slip stick is inserted to beyond the shoulders of the pelt. The portion of the stick projecting at the tail end of the pelt enables its easy withdrawal when the pelt has dried tightly on the drying board. Many experienced ranchers, omit the use of such slip sticks but are careful, however, to see that the pelts do not dry too tightly on the boards.

The pelt should now be placed in a dry, cool, dark room with good ventilation. They should not be permitted to freeze on the boards, nor, on the other hand, should they be exposed to artificial heat beyond 70 degrees. If they are exposed to higher temperatures or to direct sunlight, the pelts may become grease-burned and are discounted considerably.

The drying process, depending upon temperature and humidity, should be complete in two or three days, at which time, if the pelt is thoroughly dried, the skin or flesh side will no longer show any tendency to wrinkle when the pelt is removed from the board. When the dried pelts are removed from the boards, they should be stored in a cool, dark place until they are ready for shipment.

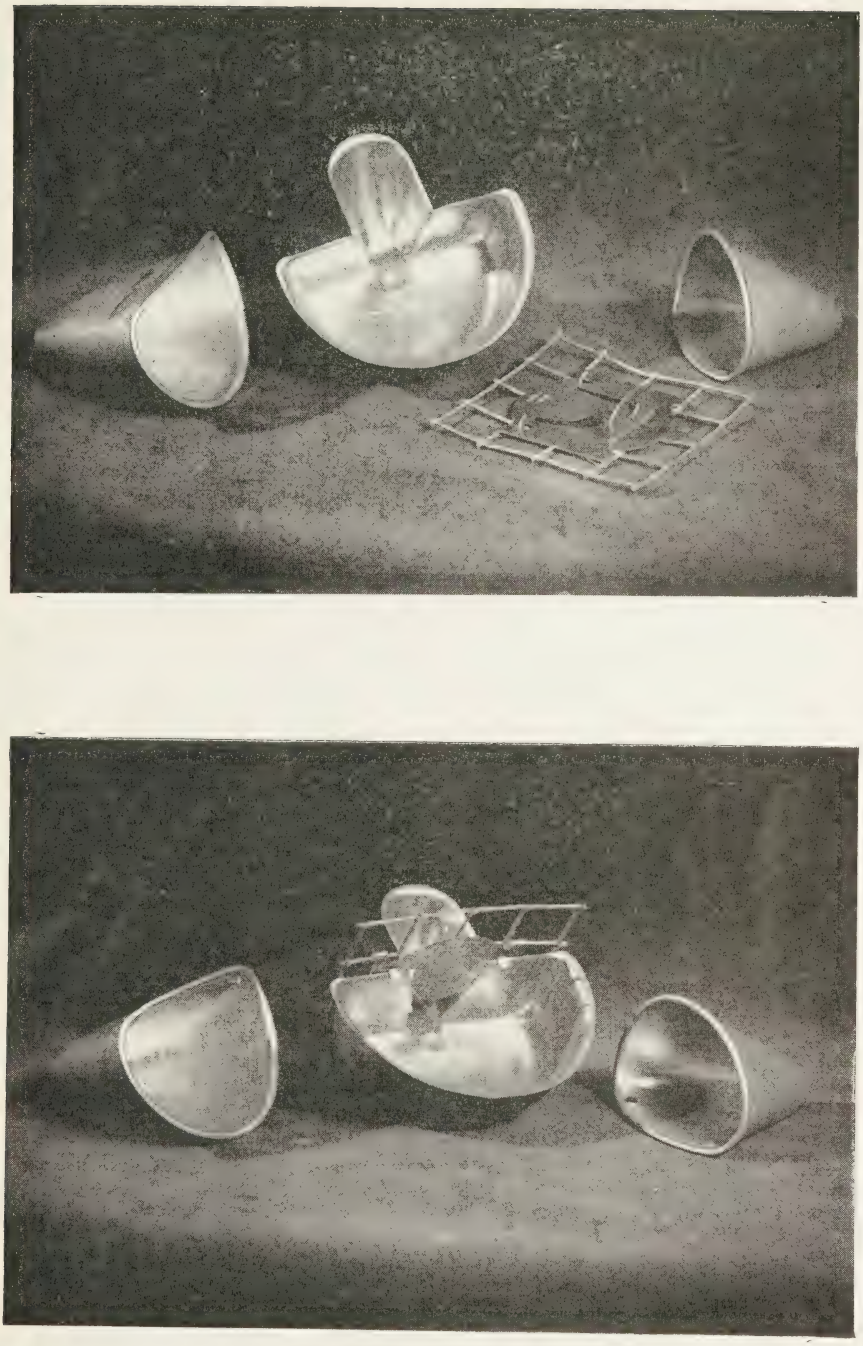


Fig. 9—Mink drinking cups. Upper photo shows cup detached; lower photo shows cup in position as on mink pen.

MARKETING OF MINK

While the requirements of different auction houses vary, the generally accepted procedure is that all skins should be shipped with the leather side out. The pelts should be laid out flat in a carton or box, when shipped to the grading station. At one time, shipping the pelts fur side out was considered desirable, enabling the buyers to see more readily the markings in certain types of mutation mink pelts. Experience has taught, however, that after such pelts were handled by numerous buyers, the fur became curly and took on a singed-like appearance. Therefore, the practice of turning the fur outside on mink pelts has been generally discontinued.

At the grading station, the mink pelts are sorted into bundles according to type of pelt and size. Usually bundles of 60 to 70 pelts are made up in approximately the number required for a mink coat. Pelts of similar size, colour and type are placed in the bundles, but where they comprise mostly large male pelts, a few female pelts of the same type (usually from the same ranch) are added to the bundle to give more character to the garment in its manufactured form.

The European fur trade prefers the smaller type pelts, probably because of their finer and silkier texture. There is keen demand, however, for large mink pelts where the colour and texture is good. Higher prices are paid for them because a smaller number of such large pelts are required to manufacture garments. Another ready market for large pelts is the "mink choker" trade, where from three to eight matched pelts are used. Premium prices are paid for select pelts for this trade.

The rancher should note that in the marketing of pelts, the following factors related to his production and handling of mink pelts are very important:—

1. Clear-coloured skins with dense fur of good texture and proper length (nap). These factors are achieved by careful selection of breeding stock in conjunction with proper breeding methods, diet and housing of mink.
2. The skins should be in the prime state, neatly pelted and free from grease. Careful pelting methods and examination of the mink for primeness before the pelts are taken will ensure these conditions.
3. Uniformity of type of pelt is desirable because it facilitates making up the bundles of skins. Linebreeding of mink gives rise to this uniformity of the pelts.
4. Large size pelts are at a premium price, provided the fur texture is fine and silky. Careful selection for large sized animals with desirable texture is the chief means available to the rancher to obtain large pelts of good fur texture.

The following is a statistical record of wild and ranched mink production and their valuation in Canada for the year 1947:—

RANCHED AND WILD MINK MARKETS IN CANADA IN 1947

Provinces	Wild Mink	Ranched	Total Value of Pelts	Av. Value of Pelts
			$	$
Prince Edward Island	284	61	5,188 00	15 04
Nova Scotia	3,091	7,017	323,456 00	32 00
New Brunswick	1,634	3,423	92,195 00	18 23
Quebec	17,410	21,236	890,966 00	25 76
Ontario	36,707	79,372	2,821,880 00	24 31
Manitoba	15,730	32,858	982,422 00	28 47
Saskatchewan	8,088	41,031	765,748 00	27 66
Alberta	4,348	124,305	1,948,291 00	19 22
British Columbia	14,607	23,478	658,650 00	17 29

Tabulated below are the numbers of mink ranchers in the different Provinces of Canada (except Newfoundland) at the end of 1948:—

Province	Number Mink Ranchers
Prince Edward Island	49
Nova Scotia	164
New Brunswick	232
Quebec	349
Ontario	1,323
Manitoba	655
Saskatchewan	350
Alberta	656
British Columbia	376
	4,154

ABSTRACT

The various phases of mink ranching are discussed under the main divisions of:—location of the mink ranch, construction of a guard fence, housing of mink in breeding and furring sheds, construction of individual breeding and furring pens and nest boxes, materials required for such sheds and pens.

Under the section on selection of breeding stock, the requirements of foundation stock and those of desirable fur characteristics of both standard dark and mutant types mink, are briefly discussed.

Methods of breeding mink are dealt with in some detail so as to include, not only the practical problems related to mating of these animals, but scientific breeding methods, such as the application of linebreeding and specific genetical formulae for various crosses of new mutant type mink. In this latter portion of the bulletin, an effort has been made to enable the mink rancher, by examples of various crosses of mutant type mink, to understand the reasoning involved so that he can, by the use of such genetical formulae, calculate the probabilities of obtaining mutant offspring from various crosses among his own mutant mink.

The subject of nutrition of mink is one in which there are wide differences of opinion and feeding practices vary across Canada, according to the economic accessibility of different feed stuffs. An attempt has been made to standardize the available information from the writer's personal experience and that of outstanding Canadian mink ranchers. The various accessory feed factors have been given in detail in the outline of rations, because of the difficulty the rancher has in determining which ones and in what quantities these essential ingredients may be present in the different commercial mink feeds on the market. Some commercial feedstuffs do not require further addition of such accessory factors. However, a guarantee of the adequacy of these special ingredients should be obtained by the rancher before omitting them from his mink rations.

The subjects of primeness of fur and pelting of mink have been discussed together because of their natural sequence in mink ranching procedure. They are highly important phases of the work in determining the final valuation of a mink pelt when it is ready for marketing. Finally, the marketing of mink pelts has been briefly outlined, as a matter of interest to the mink rancher, but a detailed discussion is beyond the scope of this treatise on the practical phases of mink ranching procedure.

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